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TEAM LEADERSHIP

Cooperation the Master Key to Modern Production

Being the First Unit
of a Course in Modern
Production Methods

BUSINESS TRAINING CORPORATION
NEW YORK CHICAGO

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Course in
Modern Production Methods

JOHN CALDER, Director

With the assistance and cooperation of

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The text of the Course is issued in six units as follows:

I. Team Leadership
II. Handling Men
III. Organization
IV. Handling Equipment
V. Production Records
VI. Management

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PREFACE

MODERN production is a matter of Men, Machinery, and Materials—of men in cooperation with one another, using machinery to change raw materials into a finished product.

The industrial plant, though it include costly equipment and giant machines and though it be housed in buildings covering acres, is after all simply a tool of production.

The raw material out of which products are made is merely lifeless matter.

Both plant and material are useless without the organizing touch and the cooperative labor of that third element, men—the men who supervise the business, and the great rank and file of those who carry out the plans of the management.

The underlying principle of it all is COOPERATION—the teamwork of managers with workmen, of workmen with one another, and of all with the tools which aid production and the materials which enter into production.

The study of Modern Production Methods is the study of this teamwork as it is organized, manned, equipped, and carried on under the tremendous pressure of present-day conditions.

I

Getting the Right Attitude

AMONG the employees taken on by a New England wire mill in the year 1878 was a sixteen-year-old day laborer who has made himself a leader in American industry.

From Day Laborer to Industrial Executive

There was nothing at the time to stamp him as out of the ordinary. In intelligence, in physical strength, in the ability to do twelve hours of hard labor, he was apparently no better than the average of his fellow workmen; and he was less experienced. Yet, within a few months this boy had outstripped many of his elders; and by the time he was twenty-one he was holding down a job as expert mechanic. Two years later he was foreman over three hundred workmen. At thirty he was general manager of the Pittsburgh Wire Company. Today he is president of the United States Steel Corporation and one of the master steel men of the world.

If you seek the reason for James A. Farrell's rapid rise and remarkable success, you will not find it in luck or "pull." Whatever difference there was between the young workman and his associates was the difference that he created himself, through his own efforts to be a better producer.

He started as day laborer and now is president of a great corporation

Mainly it was a difference in knowledge—in the curiosity to *know* plus the *energy* and *persistence* to get facts and make practical use of them.

"I know no man possessing more knowledge of his business—practical, theoretical, detailed and general—than James A. Farrell," says B. C. Forbes. "When the presidency of the Steel Corporation became vacant, there was little difference of opinion as to the ideal man for the job. James A. Farrell towered above every other figure. He knew every detail of the mining, transportation, and transmuting of ore into iron and steel, of manufacturing all classes of iron products, of how to sell at home and of how to cover the earth with American steel manufactures. And

'Jim' Farrell had one other qualification. He knew how to inspire workmen and win their loyalty."

Learning Business Day by Day

When did the steel man get this practical knowledge of his industry and of business in general? Not after he became corporation president. Not when he was export manager. Not as factory foreman. Not at any one time or in any one job, but all along, starting in as laborer, and continuing through each successive position, he was studying business, studying his job and the jobs of the men about him, seeing how they fitted into his company's organization; studying his company, its equipment, methods, and output; familiarizing himself with its problems; studying men and learning how to win their cooperation. It was his knack of going to the root of things that prepared him for one promotion after another and finally placed him at the head of the world's largest manufacturing organization.

This Course helps a man in studying industry day by day. It should be taken up, not simply as interesting reading matter, but as something practically helpful in everyday work. If the Course is followed in this spirit, it will prove a source of understanding and a power house of ideas that can be put to work, now, in your present job.

Charles M. Schwab recently commented on the tendency of American industry to draw its leaders from the ranks, and pointed out the surprising changes which a few years may bring in the standing of workmen who began with equal opportunities and equal abilities. "American industry," said he, "is spilling over with men who started life even with the leaders, with brains just as big, with hands quite as capable. And yet one man emerges from the mass, rises sheer above his fellows, and the rest remain."

From Small Jobs to Big Ones

Schwab himself exemplifies this truth. He began as stake-driver in the business of which he later became president. Eugene Grace, president of the Bethlehem Steel Corporation, entered the employ of that concern as yard switchman. Thos. E. Wilson, head of the great packing company which bears his name, used to check cattle cars in the Chicago stock yards. S. B. Hunt, a vice-president of the Standard Oil Company, began as driver of a tank-wagon. Another Standard Oil executive, W. C. Koehler, manager of that company's largest refinery, came to America as a poor immigrant and first worked here as day laborer. F. D. Underwood, president of the Erie, began as a track laborer in the Milwaukee railroad yards. Out of thirty plant managers and superintendents of Swift & Company, six started with the big packing company as clerks, five as office boys and messengers, and fourteen as day laborers. Henry Ford's first job in Detroit was that of helper in a steam-engine factory at $2.50 a week. Henry B. Thayer, formerly president of the Western Electric Company, now head of the American Telephone and Telegraph Company, began business as an office boy. W. W. Atterbury, vice-president and general manager of the Pennsylvania Railroad, started in as machine-shop apprentice at $3 a week. W. H. Todd, president of the Todd Shipbuilding Corporation, first worked as boiler-riveter in the Brooklyn navy yard.

Not only in the general administrative positions, but in the lesser executive jobs—in foremanships and in factory superintendencies—the case of Farrell is paralleled in every industry and in thousands of cases.

The Starting-Point for Promotion

Take the recent example in one of the middle-western automobile factories of a foreman whom we will call Miller. He entered the industry as an apprentice in the forge shop, and gradually pushed ahead through various subordinate positions until he became foreman. He was only one among several foremen, and in experience was the youngest of them. Yet, when the superintendency of the plant became vacant, Miller was the instant choice of the management for that important position.

"It is not that he was more brilliant than the others, or a better mechanic," said the president, commenting on this promotion. "All our foremen are reliable workers, men in whom we have confidence. The difference was mainly a difference in attitude. The other men were faithful to their particular tasks, and were good managers of their jobs. Miller was all that, and more. He was interested not only in producing forgings, but also in making automobiles. He never lost sight of the main purpose of our business—which is not to hammer out forgings, or to bore cylinders, or to assemble transmissions, but *to make and sell automobiles at a profit.*

"His attitude not only prepared him for promotion, but it actually won him the promotion. His keen interest in our business was the thing that first caught our attention—back in the days when he was machinist's helper. We are on the lookout for men who see business as teamwork—who are interested, not only in their particular machine or department, but in the factory as a whole.

Miller had that attitude. It led him to study industrial work as none of the other foremen did, and eventually it gave him a broad grasp of production principles, policies, and methods. He had trained himself in the knowledge needed higher up, and at the right opening he was moved ahead to more important work and higher pay."

Getting the Right Attitude

Success in the industrial plant, as experience shows and as observation will prove to you, is not a matter of genius, or of luck, or of unusual opportunity. It comes through loyal, intelligent, conscientious work. It is the result of growth in knowledge, in experience, in character. As later chapters will show, there are qualities that the successful industrial man must possess in body and mind, certain things that he must know and be able to do. But the starting point of all this growth—the necessary beginning of his training—lies in *getting the right attitude toward production work.*

The secret of Farrell's success was his attitude. When he accepted the job as laborer, he realized that such work was frequently a blind alley. But it was the best job he could get. What did he do? He didn't settle down in the rut and abandon himself to his fate. Right at the beginning he sized himself up, not as day laborer, but as part of the organization of a factory engaged in the manufacture of wire. He saw his labor as part of the wire-producing process—as necessary in its place as that of the mechanic, and therefore deserving of his best effort. Looked at from this standpoint, even common labor was interesting. He began to ask questions—questions about machinery, about wire-making methods, about factory organization, about the markets. When a man is interested in an activity, he is no longer content to do it simply "according to orders." He wants to know "reasons why."

From this beginning, it was just one upward step after another. There were too many jobs higher up calling for the enthusiasm, the judgment, and the well-rounded knowledge which had been born of his attitude; so he moved ahead to bigger things.

Miller's experience was much the same. It was his interest in the factory as a whole that first attracted the attention of the officers of his company; and it was this same interest that led him to study the job ahead, to see his work in relation to that of the other departments, and to fit his labor intelligently into the whole production.

Production is carried on for a profit. The idea of profit applies not only to factory production but also to individual production.

Production and the Individual

The amount of a man's wages or salary, in the long run, is dependent upon the quality or the quantity of his output. Brain work is better paid than crude muscle-work, because its output is more valuable. It comes higher, just as manganese steel comes higher than iron ore. The steel represents a higher state of preparation and is capable of serving more important needs than the crude ore. Similarly, the trained mind in the factory is more valuable than the untrained, just as the skilled worker is more valuable than the unskilled. Each is more valuable because more productive—more profitable.

The man who clearly grasps this simple idea and puts it into practise is certain to move steadily ahead to bigger things. It is not a matter of sentiment. It is self-interest and good business. Getting the right attitude toward production is profitable, not only to the business which employs you, but to yourself. It pays in actual results—in increased earning power.

The Cog-wheel Attitude

"I'm only a cog in the wheel," said one thirty-year-old mechanic. What sort of future can such a workman expect? He hasn't enough originality and push, not enough ambition and self-respect, to direct other men. He cannot see beyond the mechanical side of his job, and so he can express it only in mechanical terms.

The cog-wheel attitude is wrong. Compare with it the idea represented by the team. A team member is not a lifeless machine part. To be sure, he must follow instructions, he must obey rules, he must work toward a set goal. But he is an individual, with brains and hands capable of development, with opportunities to increase his producing power. The cog can never aspire to larger responsibility; the team member can. In fact, if he shows ability, it is almost a certainty that he will move ahead. Said one industrial executive of wide experience recently, "I have rarely known a man who really used his brains to his full capacity and failed to advance."

The team idea is the winning idea. It represents the right attitude toward industrial work—the right attitude for the routine worker no less than for the foreman or other executive. Without this attitude it is impossible to understand modern industry, or to train effectively for success. With it one can go as high as his ambition and energy and persistence will carry. It is the starting point for all success.

II

How Teamwork Developed Men

Pete Jansen and His "Yob"

PETER JANSEN was a forest guide. When the World War hit America, and our factories were calling for men to join the ranks of production, Pete left his little camp up in northern Minnesota and hurried to Chicago on the search for a "yob." He started in as "common laborer" in one of the big packing plants, and worked like a trooper in the yards and later in the hidehouse. When the armistice came, Pete was assistant foreman of a gang, but he turned in his card and asked for his time, saying, "I be going now."

"But you're just getting in this game," said the foreman, who had taken a fancy to Jansen, and saw in him the makings of a fine production man. "There are better jobs ahead for a good worker like you, who can get along with people so well and who puts his heart in his work."

"Yes," said Pete. "I got no kick on the yob. But it was just for the war I was doing it.

The war no more now, and I go back to my woods. I been woodsman all my life, thirty-seven years, and I think I keep on being woodsman."

Six months later the foreman was surprised to have Jansen show up at his office early one morning—in fact, the woodsman was there waiting when the foreman came on the job at seven.

"Glad to see you, Pete," he said cordially, shaking hands while Pete grinned. "But what on earth brings you back? I thought you were up there in the woods breathing ozone and taming wild bears."

"I been," answered Pete, "but I come back here again. I want that yob back, Boss, and I won't quit this time."

"You want your old job back, eh? But why, Pete? I insist on knowing what's happened up in the woods."

A Hankering for Teamwork

"Nothing," answered Pete. "Everything there like before. But I know this working with people now, and I like it better. I want to work with you and the gang. It goes better, boss. It's more like living than just lonesome one-man work all by my own self."

And that was it. Pete had got a taste of teamwork in his two years of war service in the plant, and he liked it. He reminds me of

Henderson, a young lawyer friend of mine who also got into industrial work during the war. Henderson had a wife and family to support, it was difficult for him to go into military service, and yet he wanted to do something directly useful in the winning of the war. So he left his law office and got a job in a shipbuilding yard. Within six months he was known as a live-wire at his work, and it was not long before he was placed in charge of one of the gangs. Before the end of the war he was assistant to one of the superintendents, and doing as well financially as he had been doing in the law. The last time I saw him, he had just taken an executive position in a well-known factory in Pennsylvania, and was enthusiastic over his new job.

"No more law for me," said Henderson. "No sir-ree, I'm out of that for good. Law is a game in which every fellow plays a lone hand. There's no teamwork. In this job, it's just the opposite. I don't like to fight and bicker with people. I want to work with them, not against them."

The best of it is that both Henderson and Pete are happy in their jobs. Each has made a place for himself in a big and worthwhile team. Each is satisfying his instinct for working in close and harmonious relations with his fellows.

A Deep-rooted Instinct

This instinct is universal. It is deep-rooted in every normal man, and in spite of the discipline which teamwork involves and the necessary limits which it puts on what we are disposed to call our "personal freedom," it represents a natural tendency of man that goes back to the very beginnings of industry. Certainly it is the fundamental principle of modern production methods, and the basis of all our civilization. The progress which the world has made from the dark ages of savagery to the refinements and comforts of modern life, is very largely the result of teamwork. Teamwork has developed the hidden resources of nature, it has harnessed steam, electricity, and water power, it has shifted the burden of toilsome labor from human muscles to iron machines, and it has developed men from crude creatures living in caves and jungles to the men of your own time. Industry as it exists today—civilized life itself—is one vast teamwork.

One is apt to think of this industrial teamwork, with its cooperation and time-saving methods, as a recent creation. As a matter of fact, it is the growth of centuries. To understand it fully we must know something of its past and see how it gradually developed, step by step.

The Primitive Age

The beginnings of modern production methods can be traced back to the days when man lived very much as the beasts with whom he shared the wilds. The primitive age was the age largely of individual effort. Each man was almost entirely dependent on his own labors to supply his needs—to get food and clothing and shelter, and to protect himself against the dangers which confronted him. It is a long journey from those crude days to the present industrial age. Some authorities mark the progress by the tools which man gradually developed. Thus it is common to speak of the Stone Age, the Bronze Age, the Iron Age, and the Steel Age as steps in the advance from savagery.

More important than tools, however, is organization. Three systems of organization mark the stages of progress:

1. The Family System.
2. The Domestic System.
3. The Factory System.

The first step toward cooperation came with the emergence of some sort of rude family organization from the unorganized condition of the primitive age. The first industrial team, the forerunner of the factory, was the family of prehistoric times—the husband, his mate, and their children.

Birth of Specialization

The formation of even this small group made division of labor possible. With his spear the man ventured forth in search of game. The woman devoted herself to preparing food or to making clothes. As the children became old enough to work, tasks were given them, and so there grew up an organization in which each member of the household performed certain work that contributed to the welfare of all. In short, there was SPECIALIZATION of work. With specialization came increase in skill. Five people in a family found that they could get a better living and get it more easily by this method of division of labor than by the old method in which each worked alone.

Compare this first industrial unit with the modern factory. The underlying idea is the same. This idea is that *specialization increases skill and speeds up production.* One hundred men in a watch factory can make one hundred watches in far less time than one man can make one watch. Why? Because in the case of the hundred men, division of labor and teamwork are possible. Each of the hundred does not try to make one watch; each performs a particular function in watch-making. One is cutting the tiny cogwheels; he cuts all the wheels for the hundred watches, and because he specializes in wheel-cutting he becomes extremely expert. Others are turning the delicate bearings; others are making the cases; and so on. By subdividing the work, each man is able to concentrate on one task. The result is skill, speed, increased production.

The Beginning of Trading

One of the results of cooperation under the Family System was that some families, in time, began to produce more than they needed. Perhaps some combination of fertile soil and favorable weather made one family's yield of grain bigger than usual. Up the river a few miles was another family whose crop had been destroyed by flood; but its winter season of hunting had been successful, yielding a large supply of furs and hides. It was natural for the river group to come to the other group and offer to exchange hides for grain. Such a plan brought advantages on both sides. The hide owners needed food; the grain owners had more food than they could use, whereas they could use the hides. So they traded.

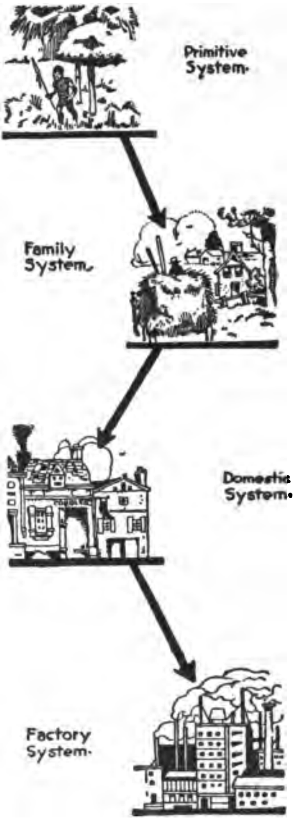
Thus the idea of teamwork spread beyond the family organization and expressed itself in cooperation between groups. In the illustration just given, to be sure, it was largely accidental. There was no organized method of cooperation between the two families. But a start in business relations was made. Communication between groups was established. The advantage of trading was proved. And another step in developing teamwork was taken.

In the course of ages the increase in facilities for exchanging goods made possible a new organization of industry under what is known as the Domestic System.

The Domestic System

Encouraged by the ease with which it could trade its surplus, a group would gradually come to specialize in the production which yielded a surplus. Thus, certain families developed skill in spinning and weaving, and gradually they found it profitable to devote all their time to textile work. By trading textile products to the producers of food and other necessities they were able to make a better living than by trying to produce all these things for themselves.

Each domestic establishment in time became a specialized shop. In the clothing industry, for example, the same family no longer performed all the steps necessary to the production of cloth. One family devoted itself to raising sheep and gathering wool. Another bought the wool from the producers and carried it for sale to the weavers. This group was the forerunner of modern brokers, who serve as middlemen between manufacturers and the producers of raw materials. The family of the weaver devoted itself to making the wool into cloth. Another family, serving as retail stores serve today, bought the finished cloth from the weavers for resale to customers.


Primitive System.
Family System.
Domestic System.
Factory System.

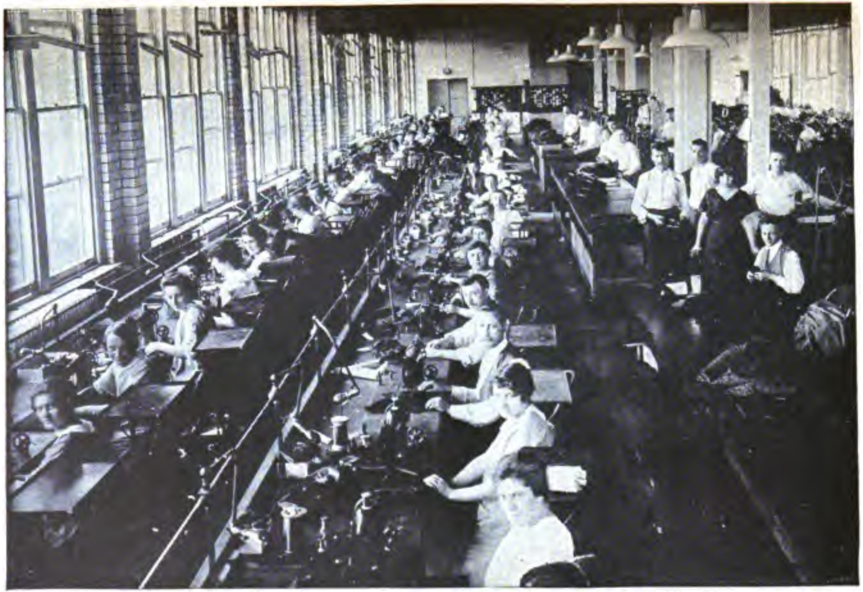
Four Stages in Industrial Development

Thus the industry of a region became "departmentalized," and the old idea of independent groups was lost in the new idea of cooperation between groups. Here and there the Family System persisted in lone examples. Especially in the thinly-settled agricultural regions the old arrangement of each family directly supplying all its own needs continued. But these were the exceptions. Group cooperation was the prevailing rule of the new age.

This age of the Domestic System bridges the period between the Family System and the Factory System under which we live today. In England, the Domestic System had become the prevailing organization of industry by the middle of the fifteenth century, and it continued to prevail until the middle of the eighteenth century.

Perhaps no three hundred years of history mark such advances in commerce as these three centuries. This was the period of great explorations, of the discovery of America, of the opening of the new route to India around the Cape of Good Hope. Colonies were being sent out to settle new lands. The rapid expansion of markets lured the trader on to vaster exploits, and this in turn stimulated the producing power of the craftsmen back home. Roadways were built; ship sailings became frequent; coach lines were established. The people of the world were becoming acquainted with one another, and were expanding their industrial cooperation beyond local boundaries.

One effect of this development was the rise of the cities. The farm ceased to be the industrial unit. Towns sprang up as families drew closer together for greater convenience



CLOTHING FACTORY INTERIOR, SHOWING CONGREGATED LABOR

One of the last industries to leave the domestic establishment for the organized factory was that which produces clothing

in trading. The seaports especially became great centers of business. Production tended to more and greater specialization as these centers grew in population and themselves became important markets. Though the home was still the workshop, industry was now highly departmentalized, and the six types of business which we recognize today were already quite distinct.

The Six Types of Business

That is to say, under the Domestic System there existed these specialized types:

1. Extractive industries, represented by producers of raw materials—farmers, fishermen, miners, lumbermen, quarrymen.

2. Manufacturing industries, represented by artisans and craftsmen—spinners, weavers, tanners, smiths, carpenters, masons.

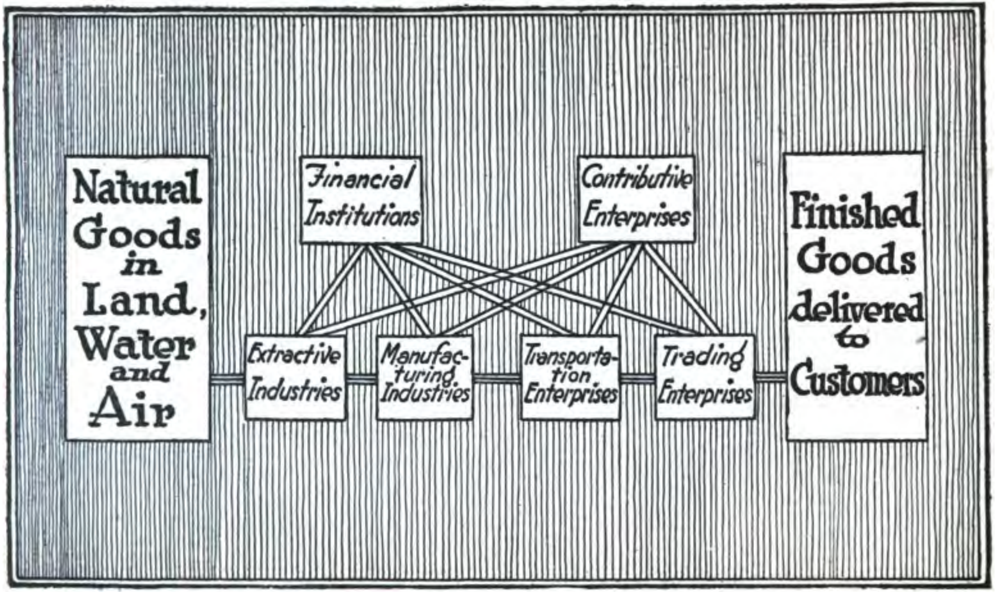
3. Trading industries, represented by merchants.

4. Financial industries, represented by banks.

5. Transportation industries, represented by caravans, coach lines, ships.

6. Contributive industries, represented by lawyers, physicians, public officials, and the like.

Side by side with the evolution of trade and industry were changes in the social structure. Political equality was slowly emerging. The



Even before the development of the modern factory, industry was specialized into these six branches idea of cooperation was being more and more applied in every department of human life. In some regions progress was more rapid than in others, even as today we find advanced nations and backward nations.

Merchant and Craft Gilds

One factor which exerted a profound influence upon business was the gilds. First came the merchant gilds, associations of traders bound together by common business interests, and these were followed by the craft gilds. Craft gilds were associations of artisans, and in time they came very largely to control their branches of industry. The craft gilds sought not only to protect and advance the interests of working men, but also to promote honest work. Standards were established. Pride in workmanship became a characteristic trait of the gild craftsman. Pride in his calling and a striving for better methods were natural results. Systems of teaching apprentices were developed, and regulations governing entrance to the crafts were established. Business training had its origin in those early efforts to improve and standardize industrial methods.

By the eighteenth century production had reached a high state of development, trade was highly organized, and many features of the modern factory were here. For example, the working force was not confined to members of the household; employees came in from the outside and worked for wages as they do today. Production was still carried on largely by handwork, however; machinery had not yet been developed.

But industry had traveled far. Each age had brought its lessons, added its improvements, and carried man farther along the road of coöperative effort.

The PRIMITIVE AGE introduced him to the forces of nature, saw him fashion his first rude tools, and taught him the way of self-preservation.

The FAMILY SYSTEM discovered the principle of cooperation and applied it in individual work through division of labor. It demonstrated the advantages of exchange.

The DOMESTIC SYSTEM took the principle of cooperation and applied it to groups. It took the idea of exchange and built up a vast system of trading. It applied specialization, not only in the production of goods, but also in the production of services.

This progress represented the slow growth of thousands of years. Then in the eighteenth century came a series of mechanical inventions, and within a single generation the old order of industry was overturned and the FACTORY SYSTEM took its place. So swift was the transition that the events which brought it about have been called the Industrial Revolution.

Effects of Teamwork

The teamwork idea, applied through thousands of years of growth and advancement, thus directly affected the organization, the methods, the equipment and the character of industry. But most important of all, from our standpoint as students of production, we find that teamwork had far-reaching effects on men themselves. It cultivated and strengthened the social instinct in man—the tendency to work with others. The demand for cooperation, for group effort under skilled leaders instead of individual solitary effort by lone workers, compelled men to adapt themselves to the conditions and requirements of teamwork.

That is to say, teamwork has developed man from the "savage" type to the "civilized" type. The hermit, the solitary in any walk of life, is a misfit today. Like the wildman of the jungle, he doesn't belong to our modern world. He is outside our teamwork, has no capacity for it, no part in it.

The man in modern industry who is a solitary, who feels antagonistic to this idea of teamwork, who wants to go it alone, will find his lot a difficult one. He may develop skill in his specialty and become an expert in some line. He may earn fair wages and be able to get and hold down a regular job. But the future is not for him in American industry. Better production is so much a matter of right relations among men, of getting along with your fellow workmen, of having the right attitude toward your job and toward the management, that mere skill alone will not carry a man very far. To succeed, it is not enough that he be just a worker. He must be a team worker.

This is the lesson of history—that industrial teamwork has called for a certain type of man, and that as industry has advanced from generation to generation its teamwork has moulded men, has influenced and trained them, and developed the traits of the good production man—that is to say, the team worker. Henderson, the ex-lawyer, and Peter Jansen, the ex-woodsman, are not freaks of nature. They are representative of millions of men all over the world who have been developed through centuries of human teamwork, and who find the natural scope for their activities in working with others. Some men lend themselves more completely to the teamwork idea than others; they feel "at home" in it; and the result is that they rapidly rise. Others slight it, or perhaps deliberately discourage it through some false twist of judgment; and later on you find them protesting when somebody else is promoted and cursing their "rotten luck."

It isn't luck—it isn't chance that makes the good team worker forge ahead. It is simply the working out of cause and effect. Teamwork has called for team workers, it has developed in men traits and characteristics that enable them to work effectively with other men. It is not hard to see why such workers make good.

III

How Machinery Developed Men

TEAMWORK is not the only factor that has affected men in industry. It was the coming of machinery that overthrew the old domestic system and made modern production methods possible. Machinery added a powerful new influence to the expansion of industry and the development of men in industry.

Before Machinery Came

Up to the time of the Industrial Revolution, about one hundred and fifty years ago, progress had been mainly in the development of human teamwork. As explained in the preceding chapter, through century after century of experience men had learned how to organize and how to cooperate with one another. But, so far as equipment was concerned, progress had been slow. Agricultural implements and manufacturing tools were still extremely primitive. Many of them showed no improvement in thousands of years. The spinning wheel and the hand loom were the most practical mechanical inventions that had been devised. Both were crude hand machines, of limited capacity, operated by foot-power, and dependent directly upon the skill of the persons operating them.

The Industrial Revolution

The awakening came in the latter part of the eighteenth century. Beginning in 1764, there followed in quick succession a series of remarkable inventions. The progress of the fifty years thereafter is strikingly pictured in ten important events of this period:

1764—James Hargreaves, a weaver, invented the "spinning jenny."

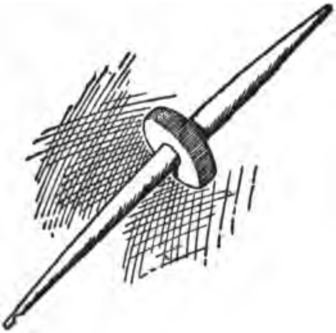
1769—Richard Arkwright, a barber, successfully operated his "water frame," a spinning machine driven by water power.

1779—Samuel Crompton, a weaver, combined the Hargreaves and Arkwright ideas in a new power-driven machine which he called the "spinning mule."

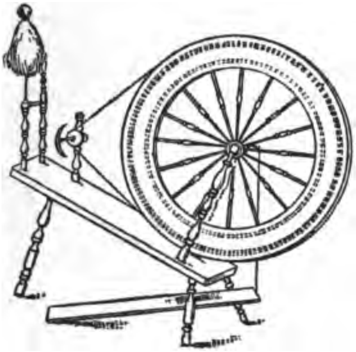
1782—James Watt, an engineer, patented a double-action steam engine designed for the propulsion of machinery.

1785—Edmund Cartwright, a clergyman, invented the power loom.

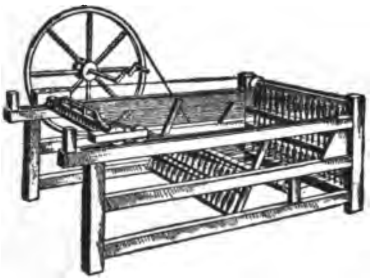
1785—Watt's double-action engine was employed to drive a textile mill.



The Primitive Hand Spindle



The Spinning Wheel



Hargreaves' Spinning Jenny

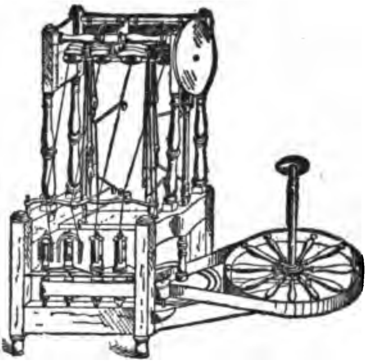
1786—Henry Cort, an iron manufacturer, invented the puddling process of converting pig into malleable iron, and perfected machinery for rolling malleable iron.

1793—Eli Whitney, a school teacher, invented the cotton gin.

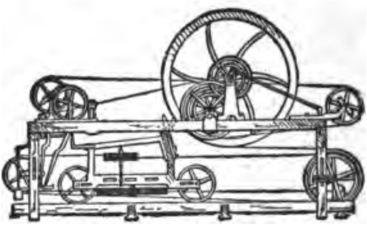
1807—Robert Fulton, an engineer, operated the first steamboat, the *Clermont,* on the Hudson River.

1814—George Stephenson, an engineer, invented the railway locomotive.

The immediate effect of the Hargreaves, Arkwright, and Crompton inventions was to speed up the spinning processes. Yarn was manufactured more rapidly than the weavers, with their old hand frames,



Arkwright's Spinning Machine



Crompton's Spinning Mule

could convert it into cloth. A power loom became a pressing need of the times, and Cartwright's invention came in answer to that demand. Similarly, the machines for spinning and weaving called for raw cotton more rapidly than hand pickers could separate the lint from the seed; this led to Whitney's invention of the cotton gin. The increasing use of machinery called for improvements in the production of iron and steel; Cort's invention directly served this need. With trade growing so rapidly as a result of machine production, increased demands were made upon transportation; the invention of the steamboat and locomotive contributed new and powerful agencies as carriers of commerce. Thus, one invention blazed the way for the next one.

Machine equipment is so common in modern industry that we little realize the change that the last century and a half brought.

Machines as Aids to Labor

There was a time when all shoes were made by cobblers, all cloth homespun and woven on hand looms, all timber cut by muscle power, all furniture made by hand tools, all meat products prepared by village butchers, all plows, implements, and vehicles built in the village smithy's shop, all paper slowly beaten out by hand, all books and newspapers set up by hand and printed by muscle power on hand-presses. Watches, clocks, tools, guns, even pins and needles, were made by hand. You have only to go into a modern machine shop and watch the lightning speed with which metal is turned, scraped, grooved and drilled, to realize how slow and hard and expensive were the metal-working processes before the invention of the lathe and the power drill. Think of the power-driven equipment in your own line of industry, and then imagine getting along without those mechanical aids to labor. Modern industry without machine equipment would be a sadly handicapped teamwork. It would be like a modern army from which you had taken away artillery, rifles, motor lorries, airplanes, wireless, and left only knives and axes and hand weapons.

The coming of machinery affected production in several ways:

1. In its methods, changing them from

handicraft to what is called "industrial" or machine production.

2. In its organization, changing it from the Domestic System of small units owned by the individual worker to the Factory System of large units owned by groups of proprietors.

3. In its personnel, developing men as masters of machinery, managers of group activities, and supervisors of production.

How Machinery Changed Methods

The change in METHODS is obvious. Not only was output increased as a result of machine production, but generally the quality of the output was better than that of the handicraft worker. Compare cloth woven by a power loom with the rough homespun of the pioneer housewife, and you see the difference at once. A machine tool can cut metal with greater precision as well as with greater speed than a man working with a cold chisel can do the same job. Mechanical equipment is not so dependent on the skill of the worker as a hand tool is.

The effect of machine equipment upon the ORGANIZATION of industry was shown in (1) the rise of capitalism and the development of the corporation, and (2) the development of the idea of profit.

By capital is meant all property used in production. Under the Domestic System capital existed chiefly in the form of land and tools. The artisan as well as the farmer was both capitalist and worker; he owned the tools of production and he performed the labor of production.

The Rise of Capitalism

Under the Factory System it became difficult for the worker to continue this two-fold function. Instead of cheap hand tools, the equipment of manufacturing was now expensive machinery. If he had money sufficient to buy machinery and equip a plant, the supervision of his investment called for all his attention. If, on the other hand, he was unable to become a factory owner, he usually became a factory worker, an employee of the owner of the machinery.

With the development of business and the consequent growth in manufacturing and trading enterprises, larger and larger amounts of capital were called for. Not only were there larger investments in fixed capital, such as factory buildings and machinery, but also more working capital was required in the form of money with which to purchase raw materials and supplies and meet the demands of payrolls and other current expenses. It became increasingly difficult for one man or even a partnership of two or three men, to supply the needed capital. Gradually a sys-

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TURNING THE MISSISSIPPI RIVER FLOW INTO POWER

This hydro-electric plant at Keokuk generates electricity to drive factory wheels in St. Louis, fifty miles away

tem of group ownership developed, by which many people joined together to contribute the necessary capital for equipping and operating a plant.

Thus, the corporation was born of the need of the factory for capital—a need created by the larger scale of equipment and operation involved in machine production.

Three Forms of Ownership

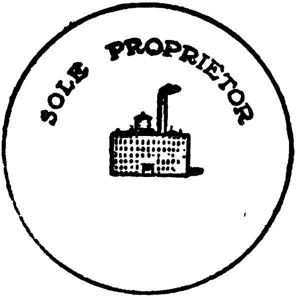
Though the corporate form has assumed the chief place in modern industry, it has not succeeded in pushing aside the older forms of ownership, so that today you will find operating side by side: (1) the sole proprietorship, (2) the partnership, (3) the corporation.

In the *sole proprietorship* one man contributes all the capital, owns the enterprise, and is responsible for its success or failure. This form of ownership, which was universal at the beginning of the factory era, is now used mostly for small enterprises involving no considerable investments of money.

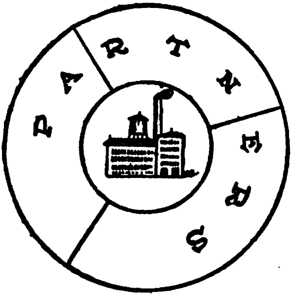
The *partnership* is simply an extension of the sole proprietorship idea. Here two or more owners share in the proprietorship and control according to an agreement among themselves. This form of ownership is largely used by trading and professional concerns.

The *corporation* is an arrangement by which many people share in the ownership of an enterprise in proportion to the number of shares of its capital stock which they hold.

The partnership rests on the basis of a private agreement among partners, and because of its nature the relation is personal and intimate. Each partner is individually responsible for all business acts committed in the firm name. Only men well known to one another will enter into a partnership; necessarily the number of its members is limited. A corporation, on the other hand, is an organization chartered by the state and subject to state supervision. Ownership in it does not involve such risks and demand such close touch with the business.



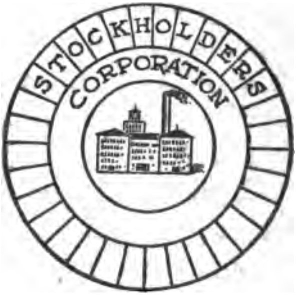
In the sole proprietorship, ownership is held by a single individual



In a partnership, ownership is divided among the partners in proportions agreed to among themselves

From the point of view of industry, the great advantage of the corporation lies in its ability to gather together large sums of money for business purposes. Shares of stock may be in denominations of

$100, $50, or even lesser amounts, and this splitting of the ownership into small units enables thousands of people to invest their surplus money and become part-owners in a business. At the same time, the total number of shares is great and provides ample capital. Another advantage is that the death or disability of an owner, which in the case of a sole proprietorship or partnership invariably calls for a readjustment of the business, does not affect the corporation. The shares pass through sale or inheritance to another, and the business itself is untouched.



In a corporation, ownership is held by a chartered body, the corporation, which is owned by its stockholders

The corporation has become the dominating form of industrial ownership under the Factory System. Not only great transportation and industrial enterprises, like the trans-continental railroads and the big-scale manufacturing and trading concerns whose capital is reckoned in millions and even in billions, but a large number of smaller enterprises have found the corporate organization the most satisfactory arrangement for financing their undertakings, and have adopted it.

Wages and Profit

With the rise of capitalism came the idea of *profit on capital.* In the old days, when the artisan represented both capital and labor, it was not necessary to distinguish the earnings of capital from the earnings of labor. But with the separation of capital and labor in the factory, such a division became necessary. Labor asked for its earnings immediately in the form of a fair wage for its investment of time and energy and ability; and capital asked for its earnings in the form of a fair though delayed return, or profit, on its investment of money.

Capital and profit are not peculiar to the Factory System. They existed long before the first power-driven machine was devised. Rent was charged on land and on agricultural implements very early in the development of organized industry, and the practise of collecting interest for the use of money was common throughout the period of the Domestic System. But the development of factories, with their vast accumulations of capital, and of corporations, with their numerous shareholders, enormously stimulated the growth of these ideas.

What *is* peculiar to the Factory System is the idea of power-driven machinery. To take a process of manufacture that required the close attention and experienced skill of an expert, and to transfer this process to an automatic or semi-automatic machine—that was the distinctive achievement of the Industrial Revolution. It added machinery to the teamwork of production.

How Machinery Affected Men

Thus we come to the third element in industry which Machinery has affected. This final factor is the PERSONNEL, the men who work in industry. During the last one hundred and fifty years, industrial men have become more and more habituated to the use of machinery and to a greater extent masters of machines and of machine processes. Today the love of machinery and expertness in using it have become second nature to genuine production men.

This was not always the case. The early attitude of handicraft workers was one of resentment. They saw their jobs being taken by the new-fangled "mechanical devils." And so there were riots in some of the industrial centers of England. Protests were voiced against these strange contrivances that were "degrading" labor and "ruining" the country. Joseph Jacquard, the French weaver who invented the type of loom now universally used for weaving patterns, was mobbed in Lyons in 1801, burned in effigy, and his machine was smashed by the crowd. Similar demonstrations took place in the industrial districts of England.

Machinery Lowered the Cost of Living

What these men failed to see was the essential fact that changed the whole structure of business and that soon brought almost every type of production into the Factory System. It was this fact: That increasing the rate of production cheapens the cost of production. The introduction of spinning and weaving machinery cheapened the cost of cloth, and what before had been only for the rich now came within the reach of those of moderate means. In every industry in which machinery was introduced, it immediately had this effect—it lowered the price and brought luxuries within the grasp of all.

Not only were standards of living raised, but workmen soon discovered that by means of machine production they could earn higher wages than had been possible in the old handicraft days. The very fact that machinery was a high-speed instrument, made the worker who operated the machine more productive and therefore of greater earning power.

Moreover, the enlargement of industry from small-scale to large-scale called for managers to direct the group activities. Executive jobs never dreamed of in the old days

Machinery Made More Opportunities

were created, and there was an increasing demand for men to fill these positions as foremen, department heads, superintendents, and works managers. Opportunities opened up, and in the school of large-scale factory production men were trained to fill these higher positions. Modern management had its beginnings in the far-reaching changes introduced by the great inventions of the Industrial Revolution.

Machinery has provided labor-saving aids and vastly increased opportunities, but it has also imposed conditions and made demands. Just as teamwork called for certain human traits and developed them, so mechanical equipment has through the years imposed its requirements and developed a new type of factory man. Whereas the old workman of the days of the cottage industries was primarily an artist to whom skill of workmanship was everything, the modern workman of the age of machinery is a trained technician who combines business sense with skill, who adds system to his pride in workmanship, and who looks to his machine as a partner in the job of production.

The point is that machinery has changed the surroundings of the production man. It is not only that his tools are different, but the tools are organized into a complex industrial plant into which he must fit. He has to cooperate with these tools, these machines. He must adjust himself to the scheduled operations. He is not only a team worker, but a team worker with machinery. He must have the instinct for machinery, a liking for mechanical operations. He must have habits of precision, orderliness, reliability. The good production man takes a pride in his equipment, in keeping it clean and ship-shape. He also takes a pride in its speed, its output, the character of its work. He gets his results through being a good partner with his equipment as well as with the management and his fellow workers.

Machinery and the Foreman

Team leadership as well as team work has been affected. The foreman who directs a group of technicians must know thoroughly his equipment and processes, if he is to get the best results from his department. Large-scale production, with its specialized processes, its complex organization, and its time-saving system, is the direct result of the introduction of machinery. Machinery has thus vitally affected the foreman's position in industry, has broadened his opportunities to get ahead, and has established new standards and requirements that must be met if he is to be a genuine success.

Machinery has made modern industry possible, not only by providing modern industrial tools, but by developing modern industrial men.

IV

New Methods in Industry

A FEW years ago the officers of a certain American automobile company awoke to the fact that their plant was not making any money. It was a large factory, well situated, equipped with modern machinery, employing 11,000 men, and turning out an average of 175 cars daily. The cars readily found buyers and the company was doing a big business, but practically everything that came in from sales went to pay the costs of production.

Of course the first remedy that would come to mind in this situation is "raise the price." That occurred to the factory management, but the sales department immediately showed how impossible it was. Competition was too keen, the company had built a great reputation on its price, and to raise prices at this stage would be business suicide. Some other way of righting the situation must be found.

The general manager called a conference of heads in the production department. It

Getting at a Production Problem

included the factory superintendent, the chief engineer, the chief designer, the head of the planning department, and a number of foremen. He frankly outlined the situation, showed his aids just how the business had been going, and then told them that the problem was up to the producing end of the business. In other words, since selling prices could not be increased, production costs must be lowered.

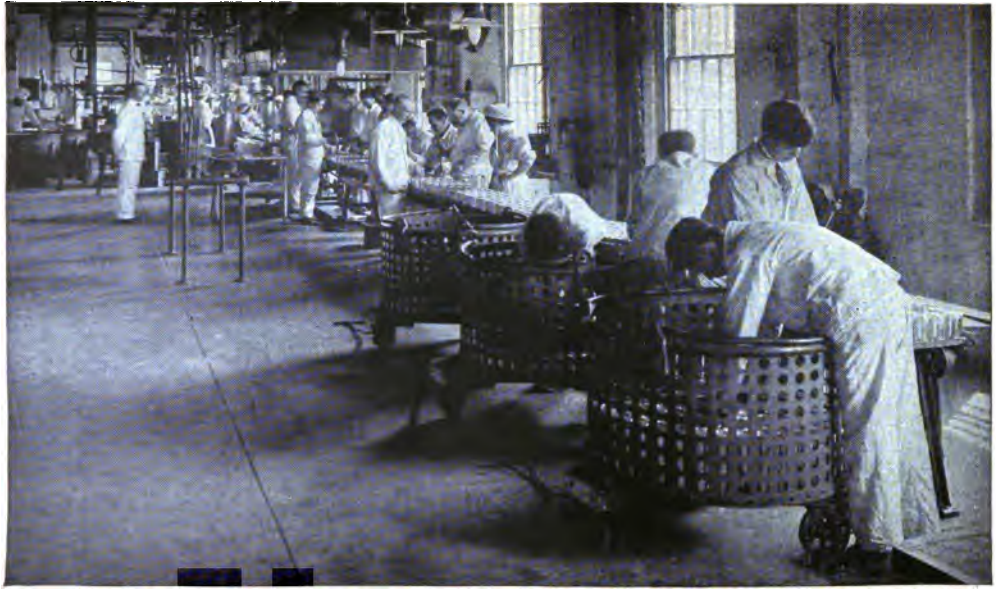
It was not a question of cutting the wage-scale, the general manager explained, nor of economizing on cheaper raw materials. It was a question of organization, of better adjustment of the teamwork of the factory, so that the rate of production would be increased. It was a question of getting more production out of the plant.

The factory men jumped to that problem. They were production men, every one of them, with a keen sense of teamwork and a just pride in workmanship. If the factory was not making good, they wanted it to make good. It was their business to make it make good. That was their attitude. Of course they were employees; their salaries and wages came regularly; they had suffered no hardships from the failure of the business to earn a margin. But they were sensible enough to know that in an established industry such a condition is not healthy; that it hinders growth; that it is certain to bring failure in the end unless the condition is remedied. So business sense as well as professional pride set them to the task. In the series of conferences that followed every man contributed his part toward working out a plan which in the course of a few months was laid before the directors of the company, approved and adopted by them, and shortly put into effect.

The Result of Planning

What was the result? Three years later that factory was turning out 250 automobiles daily, instead of 175; it was doing this with a force of 6,000 employees, instead of 11,000; it had raised the wage-scale in its plant 11 per cent, had lowered the price of its automobiles 25 per cent, and was making a good profit.

The details of how this seeming miracle was accomplished—how that factory was reorganized, its teamwork made efficient, and its production so enormously increased—make a telling story. By the one item of rearrangement of machinery alone, for example, the floor-space requirements were reduced 10 per cent. By reaching into its scrap-pile the factory saved a clean million dollars a year in waste metal. But all these details can be summarized in a list of three



SPECIALIZATION AIDS RAPID FLOW OF WORK IN THE CANNING PLANT

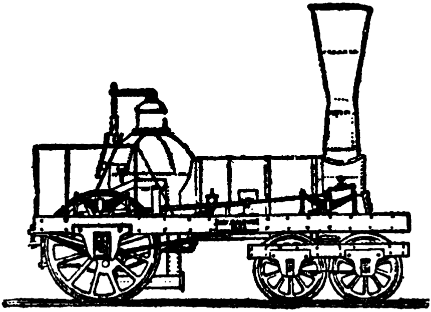
basic factors which were the chief elements in the plan of reorganization, and whose application brought to pass so remarkable a result. These factors, which you will recognize as operating everywhere in business today, are:

1. Standardization.
2. Specialization.
3. Elimination of waste.

The end sought, the purpose toward which these factors work, is the reduction of cost. The means toward that end is *big-scale production.*

Quantity Production

Big-scale, or quantity, production has come to be a chief characteristic of modern industry. Seventy-five years ago, when the Baldwin Locomotive Works were just getting established, it frequently required an entire year to build one locomotive. Today the Baldwin Works turn out around 3,000 locomotives a year, an average of about ten for every working day. Watches, which used to be made by slow and difficult processes or individual labor, are now produced in quantities so great as to startle the imagination. A single American company turns out 14,000 watches a day. And so with a long list of other products. Cameras, typewriters, phonographs, sewing machines, firearms, shoes—as well as automobiles, locomotives, and watches—are now produced not by the piece or the dozen but by the thousand or the hundred thousand.



Early Type of Locomotive

Under the old handicraft methods of the Domestic System, big-scale production was hardly known. Production costs then were a matter of simple multiplication. If one spinner could spin 100 yards of yarn in a certain period, to produce 1,000 yards within the same time involved hiring nine extra spinners. Each got the same wage, so each of the thousand yards cost practically the same as each of the hundred yards. The quantity of production did not affect the cost.

Decreasing the Unit-Cost

But with the production of machinery, manufacturers found that costs were not so precisely a matter of multiplication. The expense of operating 200 machines is not double that of operating 100 machines, though the effect of the change is to double the output. The larger number of machines may call for twice the number of attendants, but it does not involve doubling the force of firemen and engineers, nor does it call for an equal increase in the outlay for heat, light, power, taxes, rent, insurance and all those other items of "overhead expense" which enter into production.

Thus, a factory making 5,000 articles per month at a total manufacturing cost of $10,000 might find that it could double its output by an additional expenditure of $7,000. Suppose that the selling price for its product is $2.30. On the basis of an output of 5,000 the cost of production is $10,000, or $2 per unit, leaving a profit of 30 cents. On the basis of an output of 10,000 the cost of production is $17,000, or $1.70 per unit, leaving a profit of 60 cents. In other words, doubling the output means in this case doubling the margin of profit.

It was exactly this principle that guided the production men in their planning for the automobile factory: *Increasing the rate of production decreases the per-unit cost of production.* The immediate purpose of all their planning was to lower the cost of producing each automobile; any decrease that could be made would be so much profit gained.

Time and Material

In the factory there are two elements of prime importance: (1) Time, and (2) Material. Idle time and wasted material are the great enemies of efficient production. It is by utilizing time and material up to the highest notch of efficiency that the rate of production is increased and the per-unit cost of production lowered.

Every minute that a machine stands idle increases the burden of expense. The machine represents an investment of money—frequently money borrowed on bonds or notes upon which interest is paid. The interest charge is going on all the time, whether the machine is idle or productive. Every minute that a workman loses at his task lengthens the time required to complete his part of the manufacturing, and so adds to the cost of manufacture. Even where men are employed at piece-work, and it would seem that whether they work fast or slow is a matter that affects only their own pocketbooks, it is the factory as a whole that suffers from slow work. For those overhead expenses mentioned on a previous page—heat, light, power, taxes, insurance, rent, expenses of administration, and the like—do not slow up with the slow worker. They are piling up all the time; hence the great importance of making every motion and every minute count. In fact, the prime reason for the piece-rate and for the various bonus systems based upon the piece-rate is to encourage more rapid work.

An outstanding example of how a demand for quantity production was met is shown in the ship-building activities of the United States following its entrance into the War in 1917. The problem here was not so much the factory problem of lowering costs as it was the imperative war problem of turning out ships as rapidly as possible. But the methods pursued were the tested methods of the factory—the same methods which had already worked in the automobile factory, the locomotive works, and the watch factory.

Standardization

The basic factor in these methods was *standardization.* Instead of handling each ship as an individual job, calling for its own special design and for individual treatment, the government's authorities decided how many ships of a certain tonnage should be built, adopted a standard design for all ships of that size, and were then able to proceed with quantity production. If 1,000 ships of one design were to be built, it meant 1,000 engines of exactly the same type and size, 1,000 rudders just alike, 1,000 propeller systems, and all the material for 1,000 hulls, with complete equipment, fitted together in the same way.

You can see how such a policy would speed up production. Standardization made the task of building the 1,000 ships not 1,000 separate jobs, but one job. The makers of steel plate for the hulls were able to concentrate on their part of the job. An order of such size made it possible for them to install time-saving machinery to stamp and cut the steel in exactly the right dimensions. Similarly with the makers of other parts. The workmen, through concentration upon a standardized process of manufacture repeated many times, gained additional skill and speed in their work.

Specialization

Standardization calls for *specialization.* It tends to narrow the list of products. Too great variety of standard articles would defeat the very purpose of standardization, for it would increase the number of manufacturing processes. Thus the government's policy in shipbuilding was to adopt a few standard types, and specialize on these. This policy has enabled the Ford Motor Company to turn out more than 2,000 cars a day. Its big-scale production and small per-unit cost are the direct result of its specialization upon a very few types of cars. It was this policy that guided the government in its adoption of a standard motor for airplanes and of a standard machine gun for the army. Concentration upon a single product permits great division of labor, specialization in the production of parts, and increased rate of production.

Textile mills apply the same principle when they specialize on a few weaves of cloth, turning out enormous quantities of each. Similarly with shoe factories which specialize upon one or two grades of shoes. It is applying on a big scale the familiar truth that you can accomplish more and do it in less time by concentrating upon one line of work than by scattering your efforts over several lines.

Interchangeable Parts

Standardization brought *interchangeable parts.* Since each ship-part was standard, it would go equally well on any one of the 1,000 ships. This meant a great advantage in fitting the parts together. No need now to set aside a certain shaft for ship No. 5; the shaft was standard and would fit any vessel, from No. 1 to No. 1,000. Thus each part would be made in quantity and kept in stock, ready for the day when it was to take its place in the fabrication, or putting together, of some vessel. It is from this that we get the expression "fabricated ships."

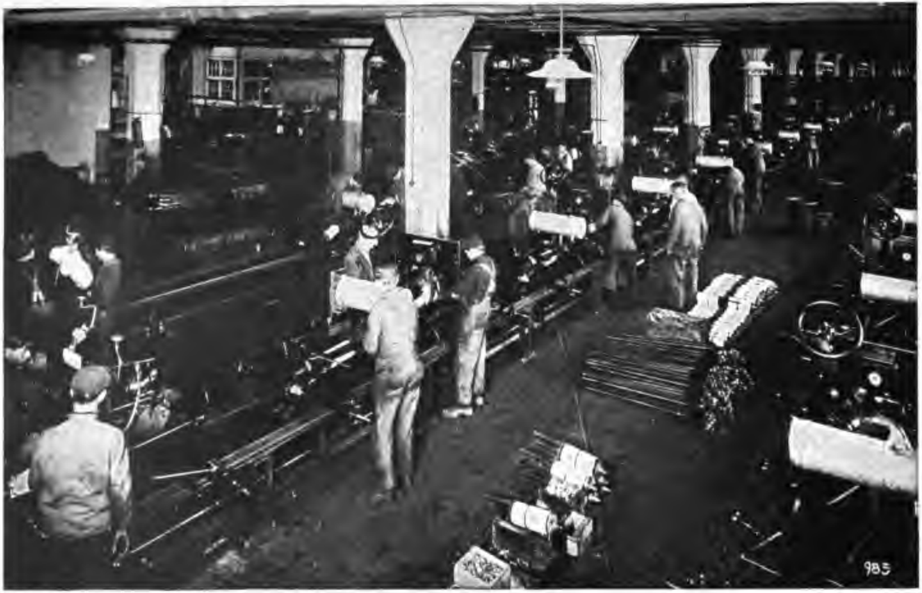
In the watch factory and in the automobile plant watches and automobiles are "fabricated" in much the same way. Time is thus gained both in the big-scale production of parts, and in the assembling of these parts into the finished product.

Standardization brings its advantages not only to the producer, but also to the user of the merchandise. The Ford owner in Manila can obtain in his local agency or repair shop the duplicate of any broken part. The typewriter which breaks a key or loses a tiny bar no longer must be sent back to the factory for repairs; the needed part can be obtained, and it will fit because it has been made standard and is interchangeable.

Elimination of Waste

But the saving of time is not the only item that affects production costs. There is that other element, material—the raw material which goes into a product and which represents a considerable portion of its cost. Modern industry discovered that much of its profit was being lost through sheer waste—through loose methods in the tool room and in the stock room, through faulty storage and inefficient handling, and through the failure to make full use of material. Hence that other factor in modern industry—*the elimination of waste.*

In the early days of the oil industry, for example, gasolene was a troublesome by-product which the refiners turned into creeks or got rid of as best they could. Today prac-



ASSEMBLING ROOM OF AN AUTOMOBILE FACTORY

The parts, which are standardized and interchangeable, are distributed in piles along the "line" of assembly. The cars are put together as they travel along the line

tically every element in crude petroleum is utilized. Cotton seed, after the removal of its lint, used to be thrown out or was burned. Now it is pressed for its valuable oils, and what remains is used as stock feed. In the packing plant today not an ounce of the slaughtered beef is thrown away; even the horns, the bones, the blood, and the hair are utilized. Mr. Armour used to say that he used everything in a pig except the squeal. In the machine shop the metal filings and scrap are carefully swept up and remelted. The lumber mill uses its sawdust as fuel.

This principle of eliminating waste is applied not only in making use of what had been thought to be useless, but also toward reducing the spoilage of material. It is applied toward the reduction of every element of waste within the factory—waste floor-space, waste machine-time, waste labor, waste power, waste supplies. Everything which enters into the operation of the factory is an element in the cost of production, and the waste of any element is a drain upon the production. It is a proverb of the Standard Oil Company that the profits of the business are in its economies.

The great advance which the last few years have brought in increasing the output of production is the result of science applied to industry. The old idea of science was a thing of text-books and musty lecture-halls and mysterious laboratories. It was something apart from the practical everyday life of the shop, the factory, and the counting room.

How Science Serves Industry

But today, science is the right hand of industry. It has taken the wasteful, slow-moving engine of Watt's time and developed the giant Corliss engine and the powerful turbine engine. It has harnessed the lightning, and added the power of electricity to that of steam; the electric dynamo, motor, telephone, telegraph, and arc and incandescent light have not only cheapened industrial processes but have decreased the dangers of factory work. It has added petroleum to the driving power of industry, developing the internal combustion engine driven by gas or gasolene. It has applied the laws of chemistry and physics to the work of the world, developed instruments of precision, and made possible that mechanical accuracy without which standardization would be impossible.

In the single field of steel manufacture, for example, the application of chemistry transformed the business from the hit-or-miss program of guesswork to the certainty of a chemical formula. Charles M. Schwab tells an amusing story of Captain Bill Jones, the famous works-manager of one of Mr. Carnegie's mills. "I remember very well," says Mr. Schwab, "the first time the Pennsylvania Railroad specified that the rails we furnished should be of a certain chemical composition. This alarmed the old captain. He had never heard such names as carbon and manganese. 'Charlie,' he said to me one day, 'this damn chemistry is going to ruin the steel business yet.'"

Many of the large industrial concerns maintain experimental departments. Here trained scientists are employed in constant investigation and testing, in the hope of working out improvements which will add to the plant's productivity. A single scientific discovery, like that of the Bessemer process of making steel, has increased the volume of production many times. The enormous cheapening of steel which resulted from this improvement in the manufacturing process, is largely responsible for the extensive use of steel in bridges, skyscrapers, and other construction.

Modern Production Calls for Brain-workers

Thus the course of industry in every line has been in the direction of (1) greater standardization, (2) higher specialization, and (3) more complete elimination of waste, through the application of science and invention to the problems of production. You might sum up all three factors in one phrase: *closer and keener thinking about production methods.* Machinery, factory organization, time-saving systems—all these are creatures of the brain of man, and man still remains the prime element in production.

But he is a different kind of man from the old handicraft worker. He is more of a brain-worker and less of a muscle-worker. Machinery takes the place of muscles, but it can never take the place of brains. Machinery is simply the instrument with which brains work—a more complicated tool than the old hand implement, but still a tool, a thing to be used. Because it is more complicated, its use involves more brain-work—more thought in organization, operation, and management—greater thought and skill in cooperation.

And so it is that the modern factory calls for brain-workers rather than muscle-workers. Muscle work is cheap and must forever remain cheap, simply because it is so inefficient. Harrington Emerson has said that "thirty men, as men work, will yield one horse-power of energy each hour; but so will one to five pounds of coal. A ton of coal may be assumed to have the energy of five men for a year." It needs only a swift comparison between the wages of five men for a year and the cost of a ton of coal to show why steam and electric power have so largely taken the place of muscle power, and why muscle power, when it is used, gets low wages.

Brains Have No Rival

On the other hand, brains command high wages. They have no rival in the field. None of the marvelous machinery which the automobile factory had in its equipment was able to solve its problem of how to lower costs. It took the brains of the production men to do that—the brains of those who planned coupled with the brains of those who put the plans into effect.

The greater and more highly-developed the teamwork, the greater the degree of intelligence required of team members. This is why modern production calls for brain-workers in every department and in every position. It is the highest development of teamwork that we have; the most specialized; the best equipped.

Just as conditions have tended to require and develop team workers and technically equipped men, so the conditions of modern industry more and more require clear-headed, open-minded, and quick-thinking men. And the tendency of modern industry is to develop such men, and to put them in places of responsibility and leadership as fast as they develop.

Capital there is no lack of. The markets are world-wide and their demand for production is enormous. What captains of industry are everywhere looking for is brains—trained minds of men and women who will enter into this teamwork wholeheartedly, who will deliberately set themselves the task of making their part of production 100 per cent efficient.

There is no danger of such people being displaced by machines. There is no danger of such people being ground down, or losing their identity in the mass. They are wanted. They are needed. Brains are at a premium today. Industry is not only willing but eager to pay the price, for the success of its teamwork depends upon the brain-work of its employees.

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Business Needs Big Men

NOT long ago a certain sewing machine company had a factory superintendent whom we will call Pierce. Pierce was a thorough mechanic, a man who had a knack for machinery and got genuine pleasure out of working with it. He had also that other and rarer gift—the knack of management, the ability to direct men and win their loyal cooperation. As a production man he seemed to be a complete success.

A Man with One Idea

But when you went on the inside of the business you found a different story. There was no belittling Pierce's ability. He got the work done, the sewing machines came out at a high rate of production, and he kept costs down to the lowest. But there are other considerations in a business than production. There are problems of sales, for example. Pierce called these "outside matters," and because they seemed foreign to his department he ignored them.

"Any improvement which was suggested because it would help sales was certain to be opposed by Pierce," said the sales manager. "For example: We had a suggestion from several dealers pointing out that a slight change in the design and placing of the balance wheel would enable our sewing machine to be attached to a motor and driven by electricity. Small motors were being manufactured by the electric supplies people and advertised as aids to the housewife. Here was a chance for us. This added convenience in our machines would give us a strong selling point.

"Yet, when the matter was put up to Pierce with the suggestion that he have a sketch prepared, he flatly turned it down. Said we were in the sewing machine business, and not tails to the kite of any electric motor manufacturers. When pressed he argued that such a change required readjustments in some of the factory machinery, which would cost money. Moreover, the improvement would add nothing to the mechanical ability of the product; it would not make a better sewing machine; therefore it was ridiculous to consider.

"It was only after this thing had been threshed out in our executive conference and was approved and authorized by the heads of the company, that Pierce would touch it. Then, when it was no longer within his power to block the proposal, the superintendent took up the task with characteristic energy and ability, and pushed it through in short order. The change cost some money, but the added sales which we got and the great gain which we won in good will as a result, many times made up for the cost."

Manufacturing Is Only Part of the Business Teamwork

From this incident, which is typical of many such tilts that occurred between the head of production and the heads of other departments, it is easy to see wherein Pierce's fault lay. It was in his *one-sidedness*. He was blind and deaf to any interest outside his own department. He never seemed to realize that the factory itself was not the whole business; that it was just one part of the whole; that the real unit was the sewing machine company with its various operating departments.

The great gain which came to industry through division of labor and specialization has been pointed out. But in this very fact of specialization there is a danger of becoming one-sided, of becoming so engrossed in one's own department that the main purpose of the work is lost sight of. That is what happened to Pierce. He had so concentrated on production, that nothing else existed for him in that business. The purpose of his work, as he saw it, was to make sewing machines, and to keep on making them at as low a per-unit cost as possible. Whereas the real purpose of his work was to make sewing machines that would please customers and earn a profit.

Looked at from this standpoint, the teamwork of the various departments and of all the men within the departments is easily understood. Each department and each man has particular tasks and individual responsibilities. The factory superintendent is responsible for keeping down factory costs; the sales manager is responsible for keeping up and increasing the volume of sales. But if keeping down costs means refusing to add needed improvements, the factory will soon find the demand for its produce falling away. If keeping up the volume of sales means selling goods on insufficient credit, the factory will soon find itself in financial difficulties. So there is an interest higher than keeping down costs or keeping up sales. It is the task of keeping the business productive as a whole—that is to say, profitable.

Internal Organization

When we come to analyze the operation of a business enterprise, we find that it involves an organization of teamwork which in its main outlines is the same for practically every type and form of business. It may be a manufacturing concern, a trading establishment, or any one of the other types of industries; it may be a sole proprietorship, a partnership, or a corporation. Whatever the type and whatever the form of ownership, its successful operation involves five distinct functions:

1. Producing.
2. Selling.
3. Financing.
4. Accounting.
5. Management.

Producing

Remembering that profit—the sale of its goods at a fair margin above their cost—is the purpose of the business, it is clear that the first step is the *production* of the goods. The petroleum company must first get the oil out of the ground; the watch company must first manufacture watches; the retail store must first procure merchandise; the railroad company must first operate trains and produce transportation; the bank must first accumulate financial resources; the engineer's office must first acquire technical knowledge. Each must produce before it can sell any article or any service to customers.

And so, the internal organization of a business must include a department whose main purpose is to look after production. In the manufacturing business, the factory itself is the producing department. Naturally, such an organization varies with the size and character of the production carried on. The production department of a large automobile company or a ship-building company is a complex structure, with numerous subdivisions; the production department of a gas company or an electric power company, whose product is made by a simple continuous process, is usually a very simple organization. The detailed makeup of a typical factory will be illustrated and discussed later in the Course, where the organization of industrial production is taken up.

Selling

Production must be followed by *selling*. And just as the organization of production varies with the size and character of the business, so with the organization of selling. Some manufacturing concerns have only small selling organizations. They may dispose of their entire output in a few large lots to jobbers or other wholesale dealers; sometimes they manufacture under contract to others who look after the distribution and sale of the goods. Such manufacturers of course have few sales problems as compared with those who because of competition or the character of their goods or markets must make

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direct appeals to buyers, organize sales and advertising campaigns, and actually win customers.

The selling function is most prominent in trading organizations, especially retail stores; but there are numerous manufacturing concerns which maintain large sales organizations. The United States Steel Corporation, the Standard Oil Company, the International Harvester Company, the General Electric Company, the Underwood Typewriter Company, the United States Rubber Company, the Burroughs Adding Machine Company, the National Cash Register Company—to name only a few—are typical of many big-scale industries in which sales effort is highly organized and expertly administered.

But whether it be by one man or by a department of five thousand experts, the sale of the factory's output is essential to the success of its business. This calls for a close relation between the two departments. The production department must be guided by the sales purpose of the organization. It must frankly recognize that goods are made to sell; which means that they must be so made that they will attract customers, please customers, satisfy customers, and build good will.

In the processes of producing and selling, capital is required. Money is needed not only

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to provide the fixed capital in the form of plant, machinery, furniture, and other fixtures, but also to provide liquid or working capital for the purchase of materials and supplies, the payment of salaries and wages and other current expenses. Because money is so continually needed, the function of *financing* occupies an important place in the operation of every business. Borrowings must be made from time to time; the credit of the business must be safeguarded; collections must be made regularly. It is clear that bad judgment in borrowing, such as accepting an interest rate above what could be had elsewhere or agreeing to burdensome terms, might easily wipe out a profit earned through careful production and sales management.

Financing

The conduct of any business involves records. Account must be kept of the possessions of the business and of its debts; of its expenditures and of its sales; of its profit and of its loss. Without adequate records, the business man would not only be in the dark as to his present standing but he would have no guide to direct his planning for the future. Thus, one of the essential functions of a business is *accounting*. Within recent years accounting methods have been increasingly applied to the factory, in the effort to make production costs less of an

Accounting

estimate and more of an actual record. The fifth Unit of this Course will go into the subject of production records in detail and make clear the specialized accounting which serves the factory.

Management

Finally, all these functions must be coordinated. That is to say, they must be kept in tune with the main purpose of the business. Without some authority above all departments and superior to all, each department might become self-centered. And so the final function is *management*, or administration. It gives unity to the business. It prevents the demands of one department from overshadowing the interests of the whole; it prevents the failure of another department to press its needs from working to the injury of the whole. The management is the centralizing and harmonizing function of the organization, the stabilizing governor which keeps the business machine operating smoothly and productively in all its parts.

We have spoken of each of these functions as represented by a "department." In small concerns this separation of functions does not exist. For example, the sawmill owner in the backwoods of Michigan may himself look after the general management of the mill, keep its books, sell its production, and attend to its financing. But as the industry grows he would find it impossible to look after all ends of the business. In time he would hire a bookkeeper, perhaps employ someone to take charge of the sale of his product, and attend to the management of production and of finances himself. Finally you come to the large-scale business, in which each of these functions must be cared for by large groups of specialists, all departments reporting back through some central authority to the owners of the enterprise.

Organization Under the Corporate Form

The most common form of ownership of an industrial enterprise, as an earlier chapter has pointed out, is the corporation. In order to see the organization of such a business and the relations existing between its owners and its operating departments, let us study the enterprise outlined in the chart on page 73. This is an organization chart for a small New England manufacturing company, and has been selected because it illustrates without too much detail the lines of authority and the separation of functions.

As the chart shows, the organization consists of four groups of factors:

1. Stockholders.
2. Board of directors.
3. The general management.
4. Four coordinate departments:

a. Production.
b. Sales and Advertising.
c. Finances.
d. Accounts.

Stockholders

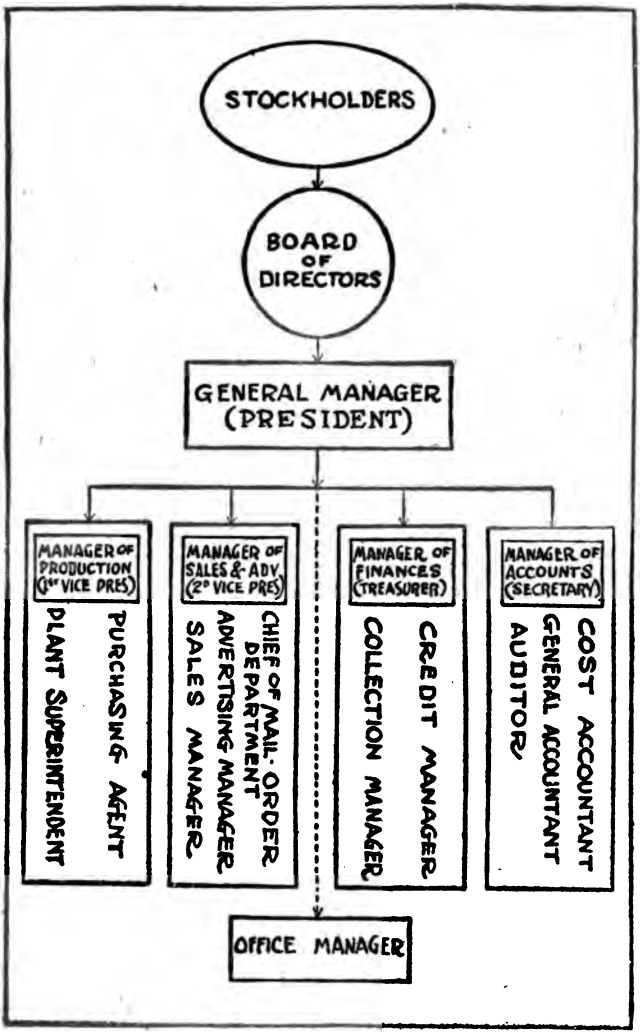
The *stockholders* are the owners of the business. They have put up the money to equip its plant and provide operating capital; whatever profit is earned goes to them, and in case of failure the loss would be upon them. Frequently, a company's stockholders are a large body, scattered over a wide territory. This is the case especially with big concerns like the United States Steel Corporation, the General Motors Company, the Pennsylvania Railroad, and the General Electric Company, each of which has a stockholders' list numbering many thousands. On the other hand, there are many companies whose stock is held by a very limited number. Sometimes a small group, three or five persons, will organize under the corporate form rather than the partnership because of the advantages to be enjoyed under that arrangement.

Usually, though, the corporation consists of a number of shareholders, many of whom have interests in other lines as well, and few of whom are able to keep in close touch with the business. So, instead of all undertaking to supervise the affairs of their corporation, they select a small committee of themselves, a board of directors, and intrust the conduct of the business to this board.

The *board of directors* is elected, usually annually, at a meeting of the stockholders. The number of persons on the board varies; it must have at least three members, and sometimes numbers as many as twenty-five. The board is given full power to operate the business, though of course it must render a report to the stockholders at their yearly meeting and receive authority for any proposed changes in general policy.

The Board of Directors

The board elects officers of the company. Always there is a president, secretary, and treasurer. Sometimes the offices of president and treasurer are combined in one man; sometimes secretary and treasurer are one. Frequently there is a vice-president or several vice-presidents. In the corporation whose organization we have charted on page 73 there are a president, two vice-presidents, a treasurer, and a secretary. At the meetings of the board of directors the president is the presiding officer, with the vice-presidents serving in turn in case the president is absent; the treasurer keeps the financial records and funds; and the secretary keeps the records of


STOCKHOLDERS
BOARD OF DIRECTORS
GENERAL MANAGER (PRESIDENT)
MANAGER OF PRODUCTION (1ST VICE PRES)
PURCHASING AGENT
PLANT SUPERINTENDENT
MANAGER OF SALES & ADV. (2D VICE PRES)
CHIEF OF MAIL-ORDER DEPARTMENT
ADVERTISING MANAGER
SALES MANAGER
MANAGER OF FINANCES (TREASURER)
CREDIT MANAGER
COLLECTION MANAGER
MANAGER OF ACCOUNTS (SECRETARY)
COST ACCOUNTANT
GENERAL ACCOUNTANT
AUDITOR
OFFICE MANAGER

AN ORGANIZATION CHART

meetings and serves as corresponding officer of the corporation.

So much for the board of directors. It is the representative body of the stockholders, acting with the full authority of the stockholders, and at its board meetings—which may be held monthly, weekly, or even oftener—passing upon plans, deciding upon policies, and in general indicating the lines to be followed in the operation of the business.

The General Management

Under the board are the operating departments, headed by the *general manager*. The general manager is the supervising head of the business, the executive through whom the authority of the board passes to the various department heads. His department is frequently referred to as the administrative office, or the general office.

In the business which we are examining, the president of the company is general manager. This is not always the arrangement. Frequently the president has a subordinate general manager, the president being the general administrative head of the business and the general manager having special supervision over the main operating department. Thus, in many large industries where manufacturing activities dominate, the general manager may be the name by which the manager of production is known. In such cases he is frequently a technical man pure and simple, and has no seat in the board of directors.

The Operating Departments

Subordinate to the general or administrative offices are the four specialized departments. The functions of these departments have already been discussed, and are indicated in brief on the chart. Thus, under the *production manager* are (1) the purchasing agent, who buys materials and supplies for the factory, and (2) the plant superintendent, who is directly responsible for the operation of the plant. Under the *sales manager* are three subdivisions, (1) mail-order sales, (2) general sales, (3) advertising. Under the *manager of finances* are (1) the department which passes upon all applications for credit, and (2) the department responsible for collecting the company's outstanding accounts. Under the *manager of accounts* are three subdivisions, (1) that of accounting, which keeps the general accounts of the business; (2) that of cost accounting, which keeps the records of costs; (3) that of auditing, which checks up the records of the other departments.

Here again it must not be assumed that the exact details of this organization are standard. For example, in the company under consideration the heads of operating departments are officers in the corporation—the two vice-presidents being in charge of production and of sales; the treasurer, in charge of finances; and the secretary, of accounts. As was remarked in the case of the general managership, these positions are frequently filled by persons outside the board who are employed especially for the purpose. Even where officers of the board are also department heads, the combinations are not always as indicated in this example. Thus, the treasurer sometimes has charge of accounts in addition to credits and collections. A more usual arrangement in the case of large corporations is to have a special executive, the controller, as the accounting head; and in conservative British practise the controller reports not to any officer but direct to the board of directors.

The office manager, a subordinate position as indicated on our chart, is in charge of the general office routine—the clerical and stenographic force and other employees of that office. In this organization he reports to the president. A frequent arrangement is to have the office manager under the secretary.

Thus, we have these four groups. The first two, the stockholders and the directors, represent the ownership and exercise control over the business; the other two groups, the general management and the specialized departments, operate the business, putting into effect the plans of the directors.

Employer and Employee

Two relationships stand out: (1) that of owner, or employer, and (2) that of operator, or employee. The board of directors, made up of selected stockholders and bearing authority direct from the whole body of the stockholders, chooses the executives of the company and, it may be, the heads of the departments. The choosing of under executives, of assistants, foremen, and workmen is usually left to the department heads themselves. Many of the big concerns have special employment departments which examine applicants for work, and determine their fitness.

But whatever the arrangement, you find the lines of authority passing down. The board selects and employs the higher executives, the higher executives choose their assistants, frequently the assistants choose those who make up the rank and file.

Everybody within the operating departments of a business, including the higher executives, is really an employee. The president may own a number of shares of stock in the corporation, but as president he is an employee. The fact that his salary is larger, and his authority over the business greater, doe not distinguish his position in principle from that of the humblest employee. He is simpl one member of the business team. As th leader of the team he may be called "boss," and in that relation those under him look t him as employer. But he too is an employee, and as such is responsible to the real boss, the body of stockholders represented by their board of directors.

Thus, viewed from every standpoint, the business organization is seen as a finely balanced teamwork in which all parts are operating toward one goal. That goal may be defined as the production of goods or service which are USEFUL to the public and which can be sold at a *profit;* usefulness combined with profit, that is the goal. The stockholders provide the capital which supplies the equipment and working funds of the business. The employees, working under the general direction of the board of directors and in their various departments under the immediate direction of the executives, provide the labor of hand and brain which uses this capital in profit-making ways. Each group is necessary to the other.

Moreover, each department within the business is necessary to the real success of the other departments. There is a tendency to

"Productive" Work and "Non-productive"

speak of work which brings in visible returns, such as the manufacturing activities, or the selling activities, as "productive," and to brand the other activities as "non-productive." Of course such an attitude is wrong. It violates the fundamental principle of organization — the principle of teamwork. The clerk whose work is checking orders is just as essential and "productive" a factor in the work of carrying on the business as the salesman who got the orders. The time clerk who keeps the records and the mechanic who makes the records are both essential factors in efficient operation.

The broad-gauged worker sees every essential work as productive. *Every man and woman in the business is a producer;* each contributes to the teamwork which produces goods or services and gets them to customers at a profit.

Moreover, *every man and woman in the business is a salesman.* Whether he is actually in the selling department or not, he is constantly influencing sales. Slipshod work in the factory may make a disgruntled customer, and kill the effect of many dollars' worth of advertising. Grouchiness, ill-humor, indifference, unfairness—these traits noticed in an individual often prejudice an outsider against the business which employs him. The opposite traits, even in an office boy or a day laborer, will win confidence and attract trade.

Modern industry calls for broad-gauged men. It demands big men. What it everywhere wants is men of judgment, men who use their brains, men who are able to get along easily with others, men who know the conditions and requirements of modern industry.

Industrial Leadership Calls for a Special Type

Modern industry is a specialized calling with its own particular requirements, its own standards and specifications. Perhaps anybody who is willing to work can get a job somewhere and keep that job and make a fair living so long as he applies himself to the work. But mere willingness to work is not enough, alone, to get a man ahead. There must be something in addition to this, if he is to climb very far above the rank and file of labor. To be a foreman is to be an executive, a leader of men as well as an organizer and director of group work; and to be a foreman requires something more than willingness, something more than the right attitude toward business, something more than technical ability, something more than teamwork, even. These are only the first steps toward advancement. They mark the starting point.

To be a successful industrial executive, a team leader, one must possess certain clearly-marked qualities. A special type of man is called for. This type will be discussed in the next chapter.

VI

The Man Who Makes Good

MODERN industry, as has been shown in the preceding chapters, is essentially teamwork. Its progress has been marked not only by the development of group production, but also by the development of mechanical equipment as aids to production, and by the application of certain fundamental principles to the methods of production.

A Teamworker with Men, Machinery and Methods

It is clear, then, that the good production man today must be (1) a TEAM WORKER; he must have (2) MECHANICAL TASTES and SKILL; he must have (3) SOUND KNOWLEDGE of present day methods, which are rapidly being changed; and he must have (4) good BUSINESS JUDGMENT that will enable him to grasp principles quickly and apply them to the day-by-day problems of the plant. In other words, he must be able to get along with other people, he must be able to get along with modern equipment, and he must be able to get along with modern methods. He must be well-acquainted and on good terms with men, machinery, and methods.

In response to the demands of industry, there has been a steady evolution toward a type of man possessing these qualifications. Teamwork developed men along certain lines, machine equipment brought a new influence which contributed to the development, and modern methods, the application of system, the expansion of production into large-scale operations, each made its contribution to the moulding of men not only for industrial teamwork but for industrial leadership. The result is that certain standard qualifications have been established, and the leader type is today generally recognized and understood. It is possible to study the makeup of an industrial executive, just as you study the layout and equipment of the plant itself. And it is this interesting subject to which we shall devote ourselves in the pages following—a study of the team leader as he exists in modern industry.

As the example of team leader for discussion in this chapter, let us take the foreman. His job calls for human engineering as well as for the engineering of equipment and work, and its requirements are typical of those of industrial management jobs higher up. In fact, the man who makes an A-1 foreman, is likely eventually to go higher. The superintendent of one of the largest silk mills in the country was a department foreman there a few years ago. The superintendent of a big electric machinery factory got his first executive experience in the foremanship. Similar cases could be cited by the hundreds. It is from these non-commissioned officers of industry, the foremen, that the great majority of the commissioned officers of the future are to be chosen.

Functions of the Foreman

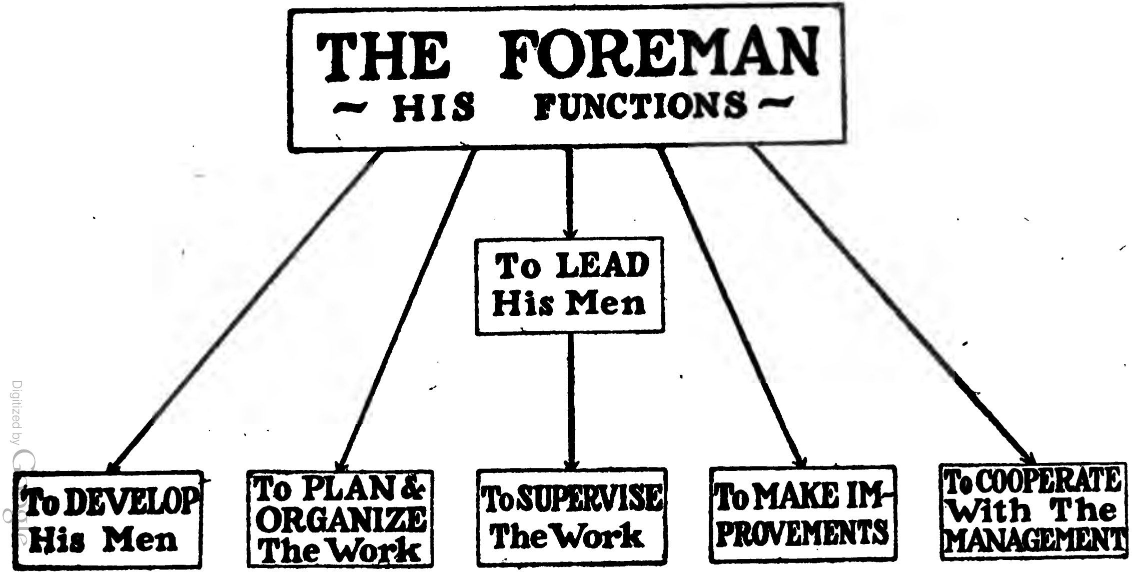
What are the functions of a foreman? They vary somewhat in different industries, and with the size of the industry and the type of organization or management that prevails. The work of a foreman in a cannery does not parallel exactly that of a foreman in a rubber tire works; and both differ in details from the work of a machine-shop foreman. Also, the foreman in a plant that has functional management is more of a specialist and less an all-round man than the foreman under traditional or line management. But they all have some duties in common, and in general we may say that the average foreman in the average American industrial plant has these six functions to perform:

1. To act as leader of the men who work under him.
2. To develop these men.
3. To plan and organize operations.
4. To supervise operations.
5. To make improvements.
6. To cooperate with the other executives and factors in the management.

What personal qualities are called for in the efficient performance of these functions? You can see at a glance that the functions vary widely. A man might be a good leader, but be very poor at making improvements; he could qualify under No. 1 but not under No. 5. Another man might be admirable in planning and organizing, but unsuccessful in instructing his men and in supervising operations. He would rate high under No. 3 but make a poor showing under No. 2 and No. 4. To be a good foreman, however, he must round himself out in the other five functions. For no matter how specialized his job, the average foreman will find himself called upon to exercise all of them in the course of his work.

Leadership

First comes LEADERSHIP. The foreman is the leader of his squad. To get the right sort of cooperation he needs more than mere obedience or compliance from his men. He needs their respect, their confidence, their loyalty. He needs to be recognized by them as leader rather than as boss.


THE FOREMAN
~ HIS FUNCTIONS ~
To LEAD His Men
To DEVELOP His Men
To PLAN & ORGANIZE The Work
To SUPERVISE The Work
To MAKE IMPROVEMENTS
To COOPERATE With The MANAGEMENT

The foreman in a St. Louis factory discovered one of his men, a recent addition to the force, openly soldiering one day. The foreman had suspected as much, for the fellow's production had been below average, and in dealings with the management he had shown a defiant devil-may-care attitude that usually goes with one type of industrial slacker. What did the foreman do? He could give the man a severe call-down and make him an example. He could fine him or fire him or apply some of the other methods of strong discipline. But he didn't. He casually stopped at the workman's bench on one of his rounds, and said, "Drop into my office, Jim, at lunch time."

As soon as the noon whistle blew Jim made his way to the little corner cubby-hole where the foreman had his desk. His shoulders were squared and his eyes showed that he was ready "to give as good as he got"—for he fully expected trouble. But instead of a call-down, the foreman motioned him to a seat. "See here, Jim," he said. "You know my position in this shop. I'm responsible for the production and when it fails to come up to schedule it's me they blame. I don't want to rawhide, and I don't mean to, but you're falling down, Jim. You're not coming through, and that hits me. I've got my results to show, and I can't show results without you fellows in the shop doing your part. How about it?"

There was no more trouble with Jim in that plant. He not only came through with his work, but he became one of the best men in the shop and eventually was made assistant foreman in one of the departments. And the secret of Jim's changed attitude was his foreman's attitude toward him. That St. Louis foreman impressed Jim, as he had impressed all the men before Jim, that he was not there in the plant as boss but rather as leader. He appealed to the men's human side. He made them see that he was one with them in their teamwork; that their fall-down was his fall-down. He showed himself to be open in his dealings—fair and frank and tactful. And his keen judgment and sure knowledge of his trade together with his energy and glowing health—these impressed all his men, as they impressed Jim, and made them see that here was a man they could really count on, a foreman who was more than a supervisor and disciplinarian—one who was really leader.

That kind of foreman is wanted everywhere in industry today. Labor turnover would rapidly diminish in volume, if all the foremen were truly leaders. Leadership is the first and perhaps the most important of the functions—for with good leadership, the other functions are greatly simplified.

Instruction

Second comes INSTRUCTION. The foreman is charged with the duty of developing the men who are placed under his leadership. This means more than technical instruction in the details of their daily work. It means more than showing a man how to handle a new piece of equipment, or how to tackle a new job—though of course these are important and must be cared for properly. But it means in addition to these ordinary responsibilities, the training of the men in right habits of thinking; it means moulding their characters, pointing out their opportunities to get ahead, and helping them to get ahead.

Sometimes you find a foreman who is suspicious of every promising young fellow in his department. He is afraid his assistant might learn as much as he knows, and get his job perhaps, or climb ahead of him. Eugene Grace, now president of the Bethlehem Steel Corporation, says this was the hardest problem he had to tackle, when as a young beginner in industry he was placed in the electrical department under a suspicious foreman. "He tried in every way to keep me from learning, his method being to assign me no duties," said Mr. Grace in commenting on the experience.

But young Grace was eager to learn, so he kept on asking questions, calling for new jobs to do, and tactfully pointing out things that he could do to help the foreman. His self-control, good humor, generosity, and strict attention to duty finally overcome the grouchy suspicion of his superior, who was really a good practical technical man in spite of his bad temper. The modern foreman—in fact, the efficient executive in every line—considers it his duty to train an understudy so that in case of accident, illness or other emergency, the foreman's work can go on uninterrupted. Moreover, the teamwork idea calls for the development of all members of the team. The modern foreman knows that it is to the interests of the plant for each member of its force to be as highly trained and capable a worker as possible.

The foreman must know the production field if he is to be a good developer of the men under him, but more than that he must be a good observer of human nature, must have judgment and control, and above all must be fair—scrupulously fair in encouraging and assisting his men to make the most of their opportunities for training.

The two functions just discussed may be called the foreman's duties with regard to human engineering. He is called on to lead and to develop the men under him. The other four functions in the list on page 85 may be called the foreman's duties with regard to plant operation. They have to do with his administration of work, with the routine of getting out the production.

Planning and Organizing

An essential factor in getting out the production is the PLANNING AND ORGANIZING of the work. This includes determining how the work is to be done and then organizing it for efficient operations. Even in a factory where scientific management is in force, and where each foreman is a specialist in some particular function of foremanship, the foreman still has to plan and organize that part of the work assigned to him. Everything cannot be reduced to cut-and-dried routine. Emergencies arise, new problems develop, new twists to old problems come up. Only by using his brains can the foreman be master here; and unless he has brains that are somewhat capable in planning and organizing, he is seriously handicapped.

The basis of wise planning is accurate analysis. The planner must keep his eyes open; he must observe; he must be able to concentrate and apply all his thinking to the one problem in hand; moreover, in his organizing, he must have rather full knowledge of his field, so as to be able to select intelligently the one right way and avoid the pitfalls. Finally, he has need of resourcefulness; he cannot expect to follow along beaten paths always, but in many an emergency successful planning and organizing depends on quick thinking along original lines.

Supervision

After planning, comes SUPERVISION. When work has been laid out and operations organized, they must be put into execution. The foreman is responsible for the output of his department or crew or gang, and his supervision is simply his expert watchful oversight of his men, his equipment, and their production operations. A good foreman knows how to keep his eye peeled without seeming to be eternally watching his men. He knows how to keep in touch with every detail of his department without seeming to pry or to be unduly suspicious. Supervision is a different function from leadership, though the two are somewhat akin. It is less personal than leadership, but it is the more effective when it is reinforced by good leadership.

Supervision literally means over-seeing. So the supervisor must have and exercise good power of observation. He must keep very closely in touch with the progress of work and the activities of the workers in his department. He needs wise judgment based on broad knowledge to exercise his control both intelligently and tactfully—and in fact, all of the traits of leadership will come into good use in expert supervision.

Making Improvements

The next function of foremanship is that of IMPROVEMENT. A good foreman is constantly on the alert for opportunities to improve his equipment, his methods, his organization. Some of the most valuable improvements in machinery have been the work of mechanics who worked with the machines, and a very large percentage of these innovations were devised and introduced by foremen. Many of the important changes in production methods which have come within the past twenty-five or thirty years in industry, and which have so largely increased the output of factories, are the results of the keen observation, resourcefulness, energy, and patient experimentation of factory foremen. It was while he was gang-boss in the Midvale Steel Company's works that Frederick W. Taylor discovered the principles of scientific management, and a year later, when he had become foreman, he started to put the first features of scientific management into operation.

Of course the modern factory does not expect every foreman to be a genius either as an inventor or a systematizer, but it does call for this sense of innovation, this faculty of making improvements. And in the unusual case, when a man does show marked inventive ability, the modern plant is quick to recognize this service in a substantial way.

Cooperation

Finally, the modern foreman must COOPERATE in the whole teamwork of the factory. He must enter heartily into the production plans of the management, and without any grudging reservations join in and cooperate with the other foremen, the superintendent, manager, and other executives. He must inform himself on the policies of the company so that his cooperation can be intelligent. This final function is of course our old friend, Teamwork, again; and in exercising it the foreman is simply applying the teamwork principle. While he is the leader of the department team, he is a member of the larger factory team, following the leadership of the management. In order that production may be efficient, he must cooperate with the management and bring his departmental leadership into conformity with its policies.

Cooperation, to be really successful, must be intelligent. A man must have knowledge —knowledge of principles and methods and of human nature itself. Judgment is needed, for everything is not laid down in black and white; a man often must use his own head and depend on his own reasoning power. Then there are qualities of temperament that are called into play; a sense of fairness is absolutely necessary; self-control and energy are both needed. In fact, all of the positive qualities of personality are needed here, in the exercise of cooperation, as indeed they are needed in the exercise of each of the other functions of modern foremanship.

The Successful Production Man

It is the positive character that wins. Negative traits discourage and depress a man, they hold him back, they keep him from doing his best even though his intentions may head him toward that goal. Indecision, hesitancy, indifference, timidity, fear, insincerity, deception, disloyalty, self-pity—none of these negative traits has any part in the character of the production man. The successful production man is the man who has these positive abilities of leadership, instruction, planning and organizing, supervision, improvement, and cooperation.

Such men are not numerous. You do not find one at the head of every department; there are not enough of them to go around. But whenever you find a factory crew, or gang, or department, that is turning out its production at a rate close to maximum, that is running smoothly with little friction and small labor turnover, there you will find at the head of that production squad a foreman who does function successfully in this six-fold way. If you analyse him, you will find that he possesses the personal qualities named. He is the type of man who makes good in industry. He represents the standard toward which modern team leadership is developing.

His tribe is increasing. It is increasing rapidly as the demands of industry are becoming more definite and clear-cut, and as men now in foremanship and in the ranks preparing for a foremanship understand what is required and seek to fit themselves for it. This training course in Modern Production Methods, which was prepared in response to a widely expressed demand of industry representing many lines of production, is a recognition of this fact. It means (1) that factories want big men in the foremanship and other executive positions, (2) that the personal qualities required have been determined and made definite, and (3) that these traits can be acquired and developed.

Just what, in detail, are these qualities that enter into the makeup of the industrial executive? The next chapter will tell.

VII

Personality in Leadership

"THE biggest problem in running our business," said the president of a large Ohio industry, "is not supplying the capital, or getting the raw material, or finding the markets.

The Factory's Biggest Problem

"All these are important and require careful management—for we are constant borrowers of money, have had our troubles with a shortage of raw material, are faced with pretty strong competition all along the line. But the problem that is always uppermost is the problem of supplying man power, of keeping our factory team fully manned and properly officered. It is not a question simply of employing applicants for jobs. It is a question of getting the right sort of men and women and fitting them into the jobs.

"We are everlastingly on the lookout for signs of leadership and executive ability. None of our 3,200 employees are more anxious for promotion than we are to promote them—for the jobs higher up are the jobs most important to us. That is why we are so careful in filling them. Technical skill and knowledge are not enough. Experience is not enough. There are certain personal traits and characteristics that the foreman and superintendent must have, and which we look for and encourage wherever we find them. Judgment, for example, and control, and a sense of fairness. These things count very high with us, for we have discovered that a foreman who lacks any one of them sooner or later fails in his job. We save the cost of labor turnover and give stability and character to our organization by testing our men fairly on all points of personality as well as on points of knowledge and skill. All promotions are based upon the result of such tests."

The merit of this company's system seems thoroughly proved by its record—the exceptional organization which it has built up and the high rate of efficiency which it has achieved. Nor is the idea an original one. Many other concerns have similar systems in force. Business is more and more coming to realize the important part which human nature plays in industrial efficiency. Production is no longer thought of in terms merely mechanical. The factory is no longer thought of as just an aggregation of machines. Industry realizes today as never before that back of all machines, back of all systems, there is the human element with its variations in ability, character, and temperament.

Thus, the modern foreman sees his problem as one of human engineering as well as of production engineering. His task is primarily that of getting out the production, of course; but he knows today that this involves more than being a good technical man endowed with plenty of authority. The foreman must not only have knowledge and skill, he must have personality. He must have the combination of personal traits called for in the performance of the six functions of modern foremanship.

Traits of the Industrial Leader

These functions, you will remember, are: leadership, instruction, planning and organizing, supervision, improvement, and cooperation. From the discussion of these functions as given in Chapter VI, we are able to list ten personal traits or qualities as follows:

1. Physique.
2. Energy.
3. Thoroughness.
4. Observation.
5. Concentration.

6. Judgment.
7. Fairness.
8. Control.
9. Resourcefulness.
10. Knowledge.

To perform successfully the functions of foremanship, a man needs these personal qualities. They are the essential traits of the industrial leader, found in varying degrees of strength in different men, but everywhere needed, and capable of cultivation and development as a later chapter will show. Let us now for a few pages look into these traits, and see what they are and why they are essential.

Physique

The term PHYSIQUE covers all qualities relating to physical fitness. It means a sound and healthy body. The man who is sickly or physically weak from any cause has a tremendous handicap to overcome. He cannot cencentrate upon his work. Only by the exercise of unusual will power can such a man be thorough in his work. It is true that some suffering from ill health have succeeded, because of their superior will power, nervous energy, and mental ability; but they are the rare and exceptional cases. Certainly, the demands of production work can scarcely be met under such handicaps, no matter how brilliant the brain power of the man.

Size is not necessarily involved in this question of physique. Both Andrew Carnegie, the great steel maker, and E. H. Harriman, the great railroad administrator, were men of small bodies. Carnegie took care of his health and lived to retire from business at a ripe old age, whereas Harriman overtaxed his physical machine and died in his prime. The difference was the difference in health. There may be merit in the argument that a big body is an advantage to the executive because it gives him an appearance of greater power and ability, and thus strengthens his control over others. But the list of small men who are leaders is a very impressive one and includes some of the greatest in history. Your physical size is a quality which cannot be altered and for which you are not responsible. Your health and physical fitness can be controlled. It is these elements in physique that call for frank analysis and close attention. The senses of sight and hearing are especially called upon for service in the factory, and their quality should be known to a certainty. All your development of mind and character, all your ability in technical work and in the control of others, must rest upon the foundation of a good physique—a sound body, health, and normal physical faculties.

Energy

Physique is not enough. Many a man of sound body and perfect health is incapable of doing good work, and there is just one word to describe his handicap; it is laziness. Many a man has lost his chance of promotion because he was slothful. The willingness and the ability to work have often been deciding factors in promotion. Alvah C. Dinkey, who started in as a water boy and became president of the Carnegie Steel Company, won the early recognition of his employers by his industry. "His rise," says Charles M. Schwab, "was predicated on his willingness to work as long as there was any work to be done."

This quality of industry which vitalizes a strong healthy body and makes it an active instrument is called ENERGY. The production man must have energy. He must have the driving power which carries him on to the day's tasks, and which by its example inspires and stimulates those with whom he works. As has been said, "The brisk foreman makes a brisk department."

The outstanding characteristic of the technician is THOROUGHNESS, and this quality enters very largely into the makeup of the good production man. Not only must his working methods be precise and accurate, but his handling of any situation in the factory must be thoroughgoing and complete. Thoroughness implies no loose ends, no neglected corners, no forgotten details. The thorough man has the power of endurance. He is reliable and steady, he has persistence. The thorough man never is content with a job that merely *looks* all right; he demands that it *be* all right, both inside and on the surface. The quality of thoroughness not only assures good work from the man who is thorough, but it inspires others to confidence in him and goes a long way toward winning the reputation of being "on the job."

Thoroughness

There are three mental traits constantly called for in production work. The first one is OBSERVATION. Observation means really seeing what your eyes behold; it means seeing with your brains, getting into your mind whatever you see. It is the faculty that picks out essential points, gets the detail of a machine, or a plan, or an order, or a factory situation, as well as its general effect. Thoroughness would be impossible without observation.

Observation

Another mental trait is CONCENTRATION. Concentration is the power of focusing attention; of shutting out all that is foreign to the task or problem in hand, and of centering all attention, thought, and energy upon the one interest. The worker is called upon to concentrate upon his process. The manager is called upon to concentrate upon his problem of getting the production out. Concentration is based upon power of observation, and works toward thoroughness and decisiveness.

Concentration

The other mental trait is JUDGMENT. The production man must be an accurate reasoner, he must be able to analyze closely, and to arrive at right decisions. Especially in the higher positions of foremanship and management he will find problems that will call for all his powers of analysis and reasoning. The steel industry in America is inseparably linked with the name of Captain Bill Jones, formerly superintendent of the Homestead Steel Works, and the trait that shone out in him with striking brilliancy was his unerring judgment. Let a situation arise in the mill, be it a question of management or of working methods, and Captain Bill could see through the problem and almost in a flash, it seemed, find the right way out. Such men seem to be endowed by nature with a genius for reasoning. Usually, however, the power is not a gift but the result of patient self-training and practise. Judgment is built

Judgment

upon observation and concentration, these three mental traits working together toward common ends.

Fairness

FAIRNESS is a first essential to industrial leadership and industrial efficiency alike. No man can be a real leader who is known to be unfair; and if he is unfair, rest assured that he will be found out before long. Fairness includes honesty, justice, loyalty, sincerity, understanding, sympathy. No man can deal rightly with the men under him unless he is able to see himself in their places, and to judge how they feel, why they act as they do, how his decision will affect them.

"How men like foreman?—that depend on hees character," said a worker to Whiting Williams, who was a fellow laborer with him in the coal fields of Pennsylvania. "Me, I do best for heem who gentleman and treat like gentleman!" And again, said Steve, the timberman, "One boss I had, oh, he was good fine boss! Fine good man he was! Fair! We all like him—everybody like him. And on account we like him, we all work for him very hard."

Human sympathy and understanding is the very foundation of fairness in an executive, though the qualities of observation and judgment also enter in. Fairness means loyalty to your plant and to the men under you.

It means standing by the company. It means doing a disagreeable duty when necessary; and it also means giving credit where credit is due, complimenting a man on a fine job done. It is the fair and square foreman or manager who wins the loyalty of his men. The slightest indication of injustice or intolerance is sufficient to destroy the good will which months of patient cooperation have built up. The man who is absolutely on the square—who will neither "do" his men nor permit any of the men to take advantage of the company—is the man who wins confidence and respect, rather than the easy-going foreman who winks at small dishonesties.

Control

The eighth characteristic of the industrial executive is CONTROL. Self-control comes first. Before a man can control others, he must be a thorough master of himself. The manager who does not permit himself to break any of the rules, who avoids tardiness like a curse, has a better grip on the management of his men than the one who permits himself to fall into loose business habits under the easy excuse that "the boss is entitled to some liberties." Not only the fact that he is fair and just, but the very act of self-discipline strengthens his sense of discipline and so increases his control over others.

Control of others is based on good judgment in sizing-up men and conditions, plus tact and skill in dealing with them. The tactful man is the man of good control. He realizes the fitness of things. He doesn't make a "call down" any stronger than it need be to get the desired result. He doesn't "bawl out" a man when a little suggestion, or a quiet five minutes of frank reasoning in the privacy of the office, will do the trick.

Patience must be mixed with tact in generous proportions to give a man good control. "Flying off the handle" on slight provocation, "going off half-cocked" without waiting to hear the full details, "raw-hiding" the bungling beginner who needs instruction and advice—these are poor instruments for leadership. A man who worked at common labor recently said one of the great retarders of efficient production is the foreman who is always yelling at his men. In gangs where this type of foreman is boss, his "Hey there!" is a sign for stoppage of work, for nobody knows which one of the gang is addressed, so as a matter of "safety first" everybody stops and looks up to see who is meant. Control is a vital element of leadership, and the foreman who has it gets things done with speed as well as with good will and harmony.

The successful production leader is RESOURCEFUL. He is ingenious in working out

Resourcefulness

problems, in meeting emergencies, in solving difficulties. This trait of resourcefulness involves ability to analyze and organize, it calls for swiftness in forming decisions, and promptness in acting. The resourceful man is usually a keen observer. He can quickly "get" a proposition, or see through a machine or a system of doing work. He is quick to apply mechanisms in ways that save time and labor. He may not be an inventor, but he has ingenuity, his mind does not run in a rut, and he has the initiative to go ahead and do a thing without mulling it over until too late.

Knowledge

Finally, the successful production man has practical KNOWLEDGE. His immediate need is (1) technical trade information, and (2) knowledge of production methods. By technical trade information is meant the knowledge that the average skilled artisan has of trade practises, the use of tools, mechanical laws, and the like. By production methods is meant the larger realm of industrial organization, operation, and management as it exists today.

A great deal of this knowledge a man picks up in the ordinary course of factory experience, but it takes more than the casual haphazard training of experience to organize this knowledge and make it an orderly working part of his equipment. Many a factory man never seems to go beyond his immediate work; never satisfies his natural curiosity as to the work of the next department. Of course he drags along in a rut; his grasp of the factory's technique is so narrow that he is doomed to routine. The executive, on the other hand, is a man whose knowledge is complete as to his field of business.

Up to a few years ago such a thing as a practical analysis of personality was unknown. It was thought impossible to apply measurement tests to so intangible an element as human nature. Science has recently proved that human nature can be analyzed and tested like any element in a laboratory. It has shown, moreover, that human nature can be changed; that a weakness can be developed, a desired trait cultivated, and a man's personality largely remade.

How the Army Proved the Value of Mental Tests

One of the greatest demonstrations of the practical working out of this idea was given through the series of mental measurement tests used in the United States Army, beginning in 1917, to determine the fitness of men for various kinds of service. By means of these tests, millions of men were examined, assigned to service or training, and developed to greater usefulness in the army organization. Officers were selected and men were picked for special branches of the service; and because the choice was based on scientific tests rather than on the old guesswork methods, there was a remarkable gain in efficiency.

Following this practical demonstration on a grand scale of the value of tests in the selection and handling of men, various industrial concerns adopted the idea, and today mental and trade tests are coming to be a regular feature in the employment systems of many plants. Universities and colleges have taken up this method of testing intelligence and in many cases regard it as more trustworthy than the old systems of examinations. Telephone companies have found it valuable in testing applicants for switchboard positions. Not only in the humbler positions of industry, but in filling the more skilled and better paid jobs, and in considering men for executive positions, the direct methods of testing intelligence and skill and character as used in the army have been applied with remarkable results.

A Practical System for Analyzing Yourself

It is this thoroughly practical idea that has been made use of in drawing up the series of Tests for Self-Analysis, which appear in the pamphlet accompanying this book. They are tests on the ten traits of the industrial executive, and are so devised as to make it a simple and practical thing for a man to examine himself and determine his relative rating on each of the qualities. By making use of these tests, applying them to yourself with absolute fairness, you can get an estimate of how you stand. And such an estimate will furnish a basis for your future program of personal development to bring yourself up to all-round industrial efficiency.

Perfection is a rare, practically an unknown, quantity. Nobody can expect to rank perfect in each trait; in fact, it should be a cause for surprise to a man to find himself rating very high in more than two or three traits. If he were actually high in all of them (not just fooling himself) he ought to be in one of the big high-salaried jobs; for he would be an uncommon man.

For most of us the really important points to look for are those in which we make a poor showing. There are the danger spots. Many a man of splendid skill, with unusually broad technical experience and knowledge, has found that some weak and undeveloped personal trait—Control, for example, or Fairness, maybe—was holding him back. It had never occurred to him that he lacked Control. If you had asked him, he would never have thought of himself as deficient in Fairness.

But the test showed him these points of weakness, and that was the beginning of his rise to executive work. Knowing his own points of weakness, he was able to develop himself out of them.

Lots of us are constantly fooling ourselves. Not intentionally, of course; we never stop to think, to analyze, to consider just where we stand. We exaggerate our abilities where we are strong, we ignore our failings where we are weak. Sometimes it takes strong measures—like a glaring failure in some undertaking, a call-down from the chief, or a sudden loss of employment—to open a man's eyes and make him see his shortcomings. Often these experiences, painful and nerve-racking though they be at the time, are really good medicine and just what was needed to shake a man out of his rut. Anything that will open one's eyes to real conditions, and assist him to a frank knowledge of himself, is a friendly ally, and a valuable one.

The First Step Toward Personal Development

The Tests for Self-Analysis are such. They are intended to help a man perform this necessary function for himself. They provide a series of straight questions, and when he has answered them he knows a great deal of very valuable information about himself. He has this information in measured form, moreover, so that he can compare his relative standing in each trait of personality, and know definitely whether he ranks high, medium, or low. With this detailed knowledge of himself, it requires only a slight effort to correct his more serious deficiencies and develop himself in all-round ability.

It will be an advantage right now to turn from your reading of the text and take up the Tests for Self-Analysis. They are printed separately, in a pamphlet, for your convenience, and will be found in the large envelope delivered to you near the beginning of this Course. When you have finished the tests, and have scored yourself in accordance with instructions, turn back to this book and read Chapter VIII. It contains many valuable suggestions, showing how you may benefit in a practical way from the self-information gained through the tests.

The Tests Are Simple and Interesting

One more point. These tests, though the result of considerable study and experiment on the part of experts in this field, are simple. They are worked out for the particular use of this Course, and are adapted to the needs of modern American industry. Moreover, they are interesting. Many a man, after spending an evening analyzing himself by means of this series of tests, has pronounced it the most absorbingly interesting game he has played in years.

Follow directions exactly, and you will find this self-analysis not only a revelation and a help to you, but also a fascinating diversion.

VIII

Developing Personality

JENNINGS," said the superintendent of the Phœnix Machinery Company to his new aid, "there are certain things I have noticed in the month you've been with us. I'd like to talk them over frankly and find out if you feel about them the same as I do."

The young man, who had remained after hours to discuss with his chief the results of an investigation he had just completed, visibly stiffened. He was a rather high-strung young fellow, and there was just a hint of resentment in the "All right, sir," with which he responded to the announcement.

A Frank Conference

"Oh, there's going to be nothing disagreeable," explained the superintendent. "You remember when we took you on fresh from the school of technology, I told you it was your fine record as a student of mechanical engineering that won you the place here. We want fellows who are sound in the fundamentals.

We've got more openings for that sort than we can find men to fill them. And I can truthfully say that we have not been disappointed in you. We expect you to become one of our most valuable men."

"Thank you, sir," said Jennings, now thoroughly at ease, and he settled back more comfortably in his chair.

"And of course," continued the superintendent, "we made some inquiry as to your character and habits, and satisfied ourselves on these points before we decided to take you into our organization. I don't hesitate to say that your record here has fully confirmed our judgment on that score. We know you are loyal, trustworthy, dependable.

"But," he hastened on, "we also realized at the beginning that your experience in actual contact with men was very slight. That handicap you frankly admitted. We accepted it, because we were confident that in the course of shop experience you would get the knack of working with others and winning their coöperation. Now you've had a month of it on this investigation. What's your own estimate? How did you make out?"

"I'm afraid I wasn't a whooping success," confessed Jennings. "I got the facts all right, but some of the men resented what they called my prying. Once they were downright dis-

Google

courteous in one of the shops, and I guess my temper got the better of me."

"That reminds me of a story that Charlie Schwab tells," said the superintendent, smiling. "He had a foreman in one of his steel mills named Schmidt, and Schmidt was having rather a troublesome time with a gang of strikers. One day the foreman came into Schwab's office dripping with mud and water, and in answer to the amazed inquiry of his boss explained that some of the gang had thrown him into the creek. 'What did you do then, Schmidt?' asked Schwab. 'Oh, I shust laugh,' answered Schmidt.

Getting the Right Angle

"In lots of cases here in the office, out yonder in the yards, and in the factory, the best way to handle a situation is to 'shust laugh' like Schmidt. And in other cases, to laugh would be fatal. It's a matter of insight, of judgment, and of tact—of getting the right angle. To know when to laugh and when to be stern—that is one of the most difficult feats in factory management, Jennings.

"And one of the most necessary," added the superintendent. "I've had some rumors reach my office from the various shops where you spent days in your investigation. As I size it up, you went at the fellows the wrong way. I gave you the authority to study the shops, to get information from the men, and you went to them with that sense of authority uppermost in your mind. Of course you riled them. They saw you as an 'investigator,' somebody who was prying. You should have given them the impression that you were there as a 'cooperator.' Get across the idea of teamwork, of mutual interest, and most of our factory problems are solved—and not selfishly for the interest of the employer alone, but to the advantage of the men as well.

"Now don't think I regard your mistake as hopeless. Not at all. Perhaps it's a good thing to have a clear-cut example of how not to do it, so that we can see what to avoid in the future. What I am going to ask of you, Jennings, is this: Will you study this problem of adjustment to others, of cooperation and teamwork just as hard as you have studied problems of machine arrangement and plant organization? Look upon it as a problem in organization and management. You are strong in some features—in your technical knowledge and ability. Here you have discovered a feature in which you are weak. The task is to develop your weak faculties, to bring them up to the standard of your strong faculties. It is first of all a problem of organization, isn't it?"

"Yes, it is," said Jennings, enthusiastically. "I'm like a factory which has one of its departments poorly equipped and undermanned. The job is a job of organizing myself for efficient work—of organizing myself as I would organize a production plant."

"You've got the idea exactly!" explained the superintendent. "Go to it, boy, and let's meet here in two weeks to note progress. We won't worry about the results of that investigation. It's this organization job you're tackling that's going to register big with me."

The Problem a Common One

There is scarcely a leader in industry who has not at some time been faced by some such problem as that which confronted young Jennings. It is seldom that you find a man whose development is all-round or complete. We are all of us specialists in some line. The feature that interests us—as mechanical work interested Jennings—has received the weight of our attention, and other features have been neglected. Our organization is one-sided. It needs overhauling, adjustment, and development.

The first step toward organization is investigation and analysis. Before you can remedy a situation, you must learn what is wrong. In Jennings' case it was the insight and frankness of the superintendent that picked out the weak spots and made him see them. In your own case, you perform this function for yourself by means of self-analysis such as that provided through the tests on the ten traits of the industrial executive. As a result of these tests, you know how you measure up. You know the goal you are aiming at. The next step is to organize to reach this goal.

The factory that is aiming at 100 per cent production must be 100 per cent efficient in each of its departments. A 100 per cent manufacturing shop and a 75 per cent power plant will not get out the production. The combination of a 95 per cent purchasing department, a 62 per cent stores department, and a 100 per cent operating department, will not get out the production. The teamwork must be balanced. Poor equipment or inefficient work in one department will drag the rate of plant output down to its level.

Deficiency in One Department Handicaps the Whole Plant

And so it is in that production plant which we call the individual. If the judgment department is weak, or if there is deficiency in the department of energy, the production of efficient service will be handicapped just to the degree of those weaknesses. If the department of physique is under-developed, high development of the department of energy will only temporarily make up for the deficiency. The good production man is an all-round man.

In the factory, a deficiency is remedied by supplying the needed element—it may be additional machinery, or a better grade of labor, or a better adjusted system. In any event it is a matter of organization—of putting together the right combination.

The foregoing chapters of this book have indicated the right combination—the combination of traits essential to success in the industrial executive. The tests have given you an opportunity to measure yourself in these traits, and now you have a fair idea of your weak spots as well as of your points of strength. Naturally your next step in this program of organizing yourself for advancement is to develop the weak traits to a fair measure of strength, so that your personal production plant may be balanced.

Development Comes Through Experience

Personal development is a matter of exercise—of experience. It is not only physical strength that one gets through exercise, but also mental strength and character strength. People are not born with fine judgments and other mental qualities; they are pretty much on a level at birth, so far as natural endowments are concerned; the difference between Thomas A. Edison, who started out as news butcher on the Grand Trunk railroad many years ago, and all the other news butchers of his day, is a difference in development. Young Edison grew mentally. He was eager for experience; this experience gave him scientific knowledge; and his scientific knowledge made possible the electric incandescent lamp, the phonograph, moving pictures, and the numerous other inventions that have come from his brain.

"It is easy to see how a man may exercise his muscle, and get physical strength," said one young assistant foreman in Houston, Texas, "but it's a different thing when you come to the ten traits. How can a man develop his Resourcefulness, for example, or his Energy or Judgment?" To answer these questions, and similar questions that may be in the minds of others, the following suggestions for developing each of the ten traits are given:

Building Physique

PHYSIQUE. Good food, fresh air, sufficient sleep, regular habits, physical exercise—these are the elements that go to make a man healthy and strong in body. The rules of health are so well-known, and so many good books have been published on the subject, that the average man is disposed to pass up any proposed discussion as "old stuff." A sound body is nevertheless the very basis of your efficiency as a production man, and only by caring for it can you safeguard it. If a machine calls for careful attention, close inspection, prompt repairs, how much more must the delicate machine of the human body call for this supervisory care?

Creating Energy

ENERGY. A good physique does not necessarily create this essential trait of energy, though the two are closely related. The man of good health and strong body ought to have no difficulty in developing energy; but at the same time he must recognize that the trait is something that must be sought and developed independently. One of the greatest aids to the development of energy is interest in work. The man who is half-hearted in his daily labor, who thinks of it only as a routine task to be performed in order to make a living, cannot be much of a dynamo on his job. It takes interest and enthusiasm to do your work with that push that we call energy. And the way to develop interest in work is to get acquainted with your own job, study it, pick out its interesting points, see what possibilities it offers, and learn its part in the teamwork of industry.

THOROUGHNESS. This trait is simply a well-established habit of taking pains. Usually the thorough workman is one who takes a pride in his workmanship, and this pride is in itself a very strong spur to thoroughness.

Acquiring Thoroughness

To acquire thoroughness, therefore, get into the habit of taking pains with whatever you do, don't hurry a job to a loose or haphazard finish, have a pride in turning out a finished piece of work, as well and satisfy yourself that each job is completed as well as you can do it. Thoroughness was one of the outstanding traits of the old handicraft workers. A man working with high-speed machinery is likely to discount its value, unless he keeps clearly in mind the fact that machinery is simply an aid to labor, and that its purpose is to make labor more effective and more productive. Machinery should never be an excuse for slovenly work. Pride in turning out a good job and a scrupulous care for the details of the job—these will give you thoroughness.

OBSERVATION. While some people seem naturally more observant than others, you will usually find that this power is the result of more careful training in earlier years.

Improving Observation

It is certain that by practice one can greatly improve the faculty of observation. As an experiment try this exercise. Carry a pencil and notebook, and for a week make it your task to note carefully and write down in your book every object seen on your way to and from your daily work. You will be surprised at the number of interesting things you will observe, when you are purposely trying to see all that is to be seen. The trouble with the man of poor observation is that he looks over the landscape with a scattering attention that focuses on nothing, and as a result he gets few impressions. By consistently making note of things and happenings, you can greatly improve your power of observation.

Cultivating Concentration

CONCENTRATION. By concentration is meant a centering of attention on some particular object. The man of concentration is able to take up a problem, put his mind on it, shut out disturbing thoughts and foreign suggestions, and think the thing through to a finish. His opposite is the scatter-brain, who cannot think "through" any one subject, but is forever on the go, dropping one problem or idea as fast as a new one suggests itself. By the exercise of will power, you can cultivate concentration. Set yourself to a task, and force yourself to see it through. Put aside other things that would distract your attention, and simply center your thoughts on the one point to be attacked. This practise, which at first may be possible only through a strong effort of the will, soon becomes a habit, and then concentration will seem second nature.

Developing Judgment

JUDGMENT. Judgment is essentially the exercise of reasoning power, and can be developed by demanding of yourself good reasons for every action that you take. By avoiding snap judgments, by asking yourself "why" whenever you are disposed to take a certain line of action, by looking on both sides of the question and considering reasons for, as well as reasons against, one gets into the habit of exercising judgment. Judgment really means a choosing between possible alternatives; frequently there are three or more possible ways from which you must choose. If you will always make your judgments in little things square with your reason and common sense, and refuse to follow mere impulse or enthusiasm, you will find yourself growing in a power that will prove mighty valuable in big things. Thus, it is by consistent practise in basing decisions on reason that one acquires the habit of good judgment.

FAIRNESS. To be fair in your dealings with others, you must cultivate the knack of understanding and human sympathy, you must be honest and just in your decisions affecting them, you must be free from prejudice, and you must be faithful in putting decisions into effect. These are qualities that can be cultivated. Avoid making a snap judgment about a man, have a little talk with him, seek to get under his skin and find out his own difficulties and problems, and you will soon find yourself looking at the situation differently. Also, you will probably find that the other fellow is not so prejudiced and one-sided in his views as before. Thus, you have not only helped yourself to a position of fairness, but have helped him to be fair. Refusal to decide issues on hearsay, a practise of demanding the exact facts in each case and listening to both sides before arriving at any decision, the barring out of all prejudices—these methods will help you to exercise fairness in your dealings with your men, and at the same time develop this trait in you to a positive degree.

Exercising Fairness

CONTROL. You gain this faculty, absolutely indispensable to an industrial executive, by developing self-control and adjustment to others. Self-control comes through the exercise of patience, judgment, and strictness in supervising your own activities. Don't allow yourself to be slovenly and loose in your working methods or habits, or in your relations with

Strengthening Control

your men. Don't allow yourself to show temper. It takes some exercise of the will to hold on to the reins, in a time of stress, when a man's nerves are frayed to the very edge by the wear and tear of a hard day, but it is possible; and it is the man who is able to keep this control, to be tactful and fair in his dealings with men, to say things that will inspire effort and encourage achievement, that makes the successful industrial leader. Here are three good rules for developing control:

> 1. Be tactful in what you say. If you have to reprimand a man, think in advance how the "call down" will hit him, and then choose your words carefully so as to get the best sort of response from him.
> 2. Be considerate in what you do. To control men, you must have their (1) respect, (2) confidence, and (3) good will. Keep these three essentials in mind. When you have a decision to make, an action to take, weigh it against these three essentials, and make sure that it does not overbalance them.
> 3. Stick by your decisions, and see them through. When your fairness and judgment and study of a problem or difficulty have brought you to a decision that is clearly the right decision, go ahead and carry the decision through. Wavering, hesitancy, holding back to see what others may say or do—all these are fatal to good control, and to successful leadership.

RESOURCEFULNESS. This involves assuming responsibility, the exercise of obser-

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vation, judgment, and energy, and practise in organizing and planning. Familiarity with your machine and process is the starting point. Know all the details, and then you are in a better position to make improvements or meet an emergency. Little things frequently count in big results. Some of the greatest inventions have been made by men who in ordinary jobs had care for the little things, and took the pains to experiment. To gain resourcefulness, you must cultivate the habit of observation, of looking for the essential thing, of being on the alert for opportunities to make improvements. When a wide-awake man discovers that something is wrong or wasteful of time or labor, his next impulse is to improve it. Practise in this sort of thing prepares a man for the unexpected emergency, and thus gives him the needed trait of resourcefulness for use in a crisis.

Cultivating Resourcefulness

KNOWLEDGE. This can be gained through experience—(1) through your own experience in work, or (2) through the experience of others, as passed on to you by word of mouth or in printed form. A man can pick up a considerable amount of technical information and of the rules of production by simply keeping his eyes open and his brains

Increasing Knowledge

busy during his daily work. But it is a long task to attempt to get all needed information in this way, so the wise production man uses every opportunity to borrow from the experience of others. Older men in the industry are frequently a mine of information, and like to "talk shop" when they have an attentive listener. One way to enlarge your knowledge is to cultivate your acquaintance with these men. Ask their opinion on things, put questions to them, and give attention to what they say. Then, there are numerous books on almost every phase of modern industry; there are the various trade papers and technical magazines, with their reports of the latest improvements; and there are generally lectures available in the larger cities, in which experts discuss factory problems. The wide-awake man, who really wishes to enlarge his knowledge, makes use of all these opportunities. This Course in Modern Production Methods offers a systematic presentation of the basic principles and foundation methods of production as they are employed in factories today, and may well be used as a guide to reading and inquiry by a man who appreciates the practical value of larger knowledge.

Thus it is possible for a man to increase his ability in any or all of the essential traits.

Sometimes you will find a fellow who has decided that it is too big a job to try to cultivate so many qualities, so he picks one or two and concentrates on them as the most important. There was one young man in a group in Chicago who decided that Control was the most important trait of the good production man; so he said he intended to develop himself in Control, and let the other traits take care of themselves. This is a poor policy. As a matter of fact, there is no "most important" trait. All are essential, just as every department in the factory is essential; and the right policy is to develop all weak traits up to a standard that will give all-round well-balanced executive ability. Of all the members of the factory team, the leaders are the ones who can least afford to be one-sided. The success of the teamwork depends upon their broadness of view, their accuracy in choosing men and methods, and their ability to get men to cooperate, and to keep them cooperating. Physical ability, mental ability, and character ability—as described in detail in the ten traits—are called for; and not one of them can be safely omitted.

You can see, from this discussion, what foremen, superintendents, managers, and other industrial executives mean to modern production. If the basic principle of production is teamwork, the essential to good teamwork is good leadership. A poor team can frequently be pulled through by good leadership, but a good team is hopelessly handicapped if it has to depend on incapable leaders. What holds true on the athletic field or the battle field, is true also in the factory. It is good leadership, good management, good foremanship, that is usually the deciding element in bringing success out of what would otherwise be failure.

Leadership and Teamwork

The type of leadership called for is that exemplified in a great industrial manager who when asked, "How many men do you have under you?" replied, "There are four thousand men working with me." The modern industrial executive works *with* his men. And his control over them is none the less secure and the results he gets are none the less productive because of that attitude of cooperation. On the contrary, his control is really stronger, the output of his department or plant is usually higher, and the stability of his working force is greater, because of the reduced friction and increased good will resulting from such an attitude between leader and men.

If you have the teamwork idea, you can easily grasp the importance of the ten traits.

Teamwork calls for character qualities as well as for qualities of mind and of hand, and team leadership is more than giving orders and seeing that they are obeyed. Modern industrial management is essentially man-management, for in spite of all the perfection of mechanical equipment and operating systems, production is primarily human teamwork—the cooperation of men under the leadership of men.

The Keynote of Production Methods

This is the keynote of modern production methods. Later units of the Course will take up the detailed methods of handling and organizing men, methods of handling equipment, using production records, organizing and directing management. The practises of modern industry will be indicated and illustrated. But all through the Course you will keep in mind this basic idea of teamwork. Modern production methods are built on it, and have been shaped by it, just as the workers in modern industry and the leadership of modern industry have been moulded by it through the centuries.

This first text-unit is not only the basis of the whole Course, but it shows the only sure foundation for success in managerial work. The foremen, the assistants, the superintendents, the managers, the executives in every rank who are really top-notchers in industry, are men who measure up to the picture of industrial executive given in this book. They are men who have the teamwork idea, who see their responsibility as primarily that of leader rather than of boss, and who possess in fairly balanced development the ten traits of the industrial executive.

You will find this true in every industry, for the leadership type is essentially the same for all lines of production work.

You will find it true in your own industry. The opportunities are there. The requirements are known. You can make good in a big way by organizing yourself for advancement, basing your plans on the results shown by your self-analysis, and then pushing ahead to put these plans into practise. Succeeding units of the Course will give you much valuable information. It will be of permanent value only as you use it—apply it—put it to work. You can begin to forge ahead right now, by taking the ideas of this unit and putting them into practise.

QUIZ QUESTIONS

I

1. What is meant by "the right attitude toward production work"?
2. Why is brain-work better paid than crude muscle-work?
3. How does "the cog-wheel attitude" differ from "the right attitude"?
4. What basic idea enters into "the right attitude"?

II

5. What has teamwork done to aid the progress of mankind?
6. How did cooperation enter into the organization of industry under the Family System?
7. How does specialization tend to increase skill and speed of production?
8. Describe the origin of trading, as it is outlined in the text.
9. How did trading lead to the development of the Domestic System?
10. Name the six general types of business enterprises.
11. What were the craft gilds? How did they differ from the merchant gilds?
12. How did teamwork develop men?

III

13. What element did the Industrial Revolution add to the teamwork of production?
14. What was Hargreaves' invention? Arkwright's?

Crompton's? Cartwright's? Who invented the cotton gin? The railway locomotive? How did James Watt contribute to the Industrial Revolution?

15. How did the coming of machinery affect the methods of production?

16. Did the coming of machinery affect quantity production only?

17. How did the coming of machinery affect the organization of production?

18. What is capital? How did the Factory System affect the rise of capitalism?

19. How does the sole proprietorship differ from the partnership form of business ownership?

20. What are the distinguishing characteristics of the corporate form, as contrasted with the two other forms of ownership?

21. What is the connection between the ideas of capitalism and of profit?

22. What is the distinctive feature of the Factory System?

23. What was the effect of machinery in every industry in which it was introduced?

24. How has machinery affected the type of man in industry?

IV

25. How does big-scale production lower the per-unit cost?

26. What is "overhead" expense?

27. What two elements are of prime importance in obtaining the lowest per-unit cost of production?

28. How does standardization lead to specialization?

29. How is interchangeability of parts a factor in big-scale production?

30. How does standardization benefit the consumer?

31. In what ways has modern industry applied the principle of eliminating waste?

32. How does science serve industry?

33. What is meant by the statement that "Modern production calls for brain-workers"?

V

34. Name five distinct functions that enter into the successful operation of a business.

35. What four groups of factors are represented in the organization of the company charted in this chapter?

36. What group holds the ownership of the business?

37. What is the board of directors, and whom does it represent?

38. What is the function of the general manager (chief executive) of the business?

39. In the organization charted, what two executives are under the production manager? What three subdivisions are under the sales manager? What two departments are under the manager of finances? What three subdivisions are under the manager of accounts?

40. What is the function of the stockholders in the teamwork of the business? What is the function of the employees?

41. In what sense are all useful members of a business organization "producers" though they may not work in the production department?

42. How is it true that every man and woman in the business is a salesman?

VI

43. What four qualifications are required of a good production man?

44. Name the six functions that practically every foreman performs?

45. Why was the method used by the "St. Louis foreman" so effective?

46. Why is it a good thing for a foreman to train an assistant?

47. Why is resourcefulness necessary to a foreman in performing the planning function?

48. Should a foreman run his department without thought or regard for other departments?

VII

49. Name the ten essential traits of the industrial executive.
50. Why is physical fitness necessary?
51. If a man has good Physique, how has he need of Energy?
52. What is meant by Thoroughness?
53. Name the three essential mental traits, and explain what they are.
54. Why is Fairness important in the makeup of the good production man?
55. What is meant by Control?
56. What is Resourcefulness?
57. What two classes of Knowledge are essential to the good production man?
58. What is the purpose of self-analysis?

VIII

59. How can your own problem of self-development be considered in terms of plant reorganization?
60. How does a weakness in one department handicap the entire production?
61. How can deficiencies in personal traits be remedied?
62. Name methods by which you can develop the following: Physique, Energy, Thoroughness, Observation, Concentration, Judgment, Fairness, Control, Resourcefulness, Knowledge.
63. Why is good leadership the decisive factor in modern production?
64. What is the keynote of modern production methods?

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